750 PAD ACCELERATED SOLAR POND SLUDGE REMOVAL SAFETY ANALYSIS
A/B Pond Sludge Removal and Storage

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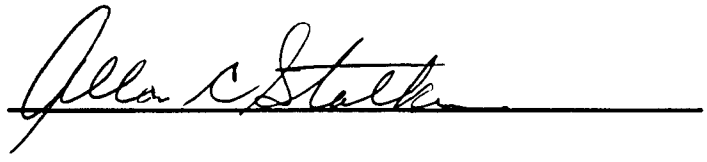
39 pages



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750 PAD ACCELERATED SOLAR POND SLUDGE REMOVAL SAFETY ANALYSIS
A/B Pond Sludge Removal and Storage

1.0 INTRODUCTION

The accelerated solar pond sludge removal program will remove sludge from the solar ponds and store the sludge on the 750 Pad in 10000 gallon double walled polyethylene tanks. A minimum of 23 tanks will be required for the storage of the 207A/B Pond sludge. The 207A Pond, 207B North Pond, and 207B Center Pond sludge has already been pumped into the 207B South Pond. The sludge will be moved by sucking it into a 13 cubic meter (17 yd^3) truck, driving the loaded truck into the tent containing the storage tank, and pumping the sludge into the tank. This operation will be continued until the 207B South Pond is empty.

2.0 DESCRIPTION OF EQUIPMENT

The vacuum truck is called the "Guzzler" and operates with a Dresser or Hargreaves Positive Displacement Vacuum Pump rated at 380 mm (15") of Hg and 5141 CFM at full vacuum. The truck has a 13 cubic meter (17 yd^3) Cleanbore Body, designed for maximum separation of heavier materials from the air stream. The payload capacity is rated at 12 2 m^3 (16 yd^3) It has four removable 16" top mounted centrifugal separators with easy-access clean-out ports to insure maximum separation of material and dust from air stream prior to the baghouse stage filtration. The baghouse has 60 acrylic coated filter bags with an automatic bag pulsing feature It has a stainless screen fitted in the vacuum tube make-break connection as a fail-safe barrier to any pump damaging material.

The truck will be driven to the solar pond The truck mounted suction hose will be attached to a boom mounted extension hose and collection wand at the solar pond. The truck will be loaded with 12 2 m^3 of sludge. When the truck is full the hose will be sucked empty The boom extension will be disconnected and a cap will be installed for the trip to the 750 Pad. The truck will then be driven to the 750 Pad

Each storage tank set will consist of a closed primary tank 13'6" in diameter inside of a 14' secondary open-top containment tank, with a maximum capacity of 11500 gallons. The working volume is 10000 gallons. Both tanks are constructed of high density crosslinked polyethylene. The wall thickness is calculated for the appropriate hoop stress for sludge up to a specific gravity of 1.9. A leak detection system is provided to detect leaks from the primary tank into the secondary containment tank Twenty of these tank sets will be in Tent 3, 22 in Tent 4, and 29 tanks in Tent 6. The tanks will be located on both sides of the tent with sufficient aisle space between the tanks to drive the transfer truck.

The vacuum truck will be backed into the tent to the tank to be filled. A sludge pump, rated at 200 gpm maximum, will be connected to the polyethylene tank with a three inch line. It will take from 16 to 30 minutes to empty the truck into a tank. Each tank will be filled with approximately 10000 gallons of sludge. The truck will then be driven back to the solar pond for the next load.

3.0 ACCIDENTS

3.1 DRAFT SAFETY ANALYSIS REPORT FOR THE 750 AND 904 PADS

A Draft Safety Analysis Report (SAR) for the 750 and 904 Pads Temporary Pondcrete and Saltcrete Storage Facilities was written with the expected waste form as pondcrete or saltcrete in half triple-wall body package (triwall box), half flush-panel plywood box (half box), full flush-panel plywood box (full box), and corrugated metal waste container (metal crate). The Hazard Classification for the facility was calculated based on a small airplane crash into the facility with the resultant release due to impact, fire, and entrainment release of hazardous chemicals and radionuclides. The facility was designated as Category 3. The total quantity of material involved was 1.71×10^7 kilograms, with a total 80 kg of pondcrete released into the atmosphere. The chemical composition of the pondcrete was based on the 95th percentile of 19 samples analyzed for a variety of hazardous constituents for pondcrete produced from the 207A Pond.

Three bounding accidents were evaluated in the 750/904 Pads draft SAR for assessing the consequences of these accidents. They were.

1) A spill of 5.12×10^3 kg of pondcrete over a five minute period releasing 0.034 kg of material to the atmosphere,
2) A 30 minute fire involving $2\ 15 \times 10^5$ kg of pondcrete releasing 0 9 kg of material to the atmosphere, and
3) A 2 hour fire involving 1.89×10^6 kg of pondcrete releasing 7 6 kg of material to the atmosphere

Table 1 presents a summary of the results for the radiological and chemical hazard analysis calculations from the draft SAR

3.2 EARLY REMEDIATION OF SOLAR PONDS ACCIDENT ANALYSIS

Early remediation of the solar ponds will move the contents of the ponds to tanks installed inside of tents on the 750 Pad. The total quantity of A/B Pond sludge/water mixture that will be placed in storage on the 750 Pad is approximately 1×10^6 kg The sludge will occupy approximately 23 of the 10000 gallon storage containers

The aircraft scenario used in the bounding SAR analysis was not repeated for the tanks of sludge. The estimated 1×10^6 kg of total material in the tanks represents approximately 6-percent of the total material inventory (i e , $1\ 7 \times 10^7$ kg) assumed to be involved

in the aircraft crash and ensuing fire. In addition, unlike pondcrete, the water content of the sludge would act to inhibit fire propagation. As a result of the placement of the tanks on the 750 Pad, the actual pondcrete capacity is diminished from that assumed in the SAR analysis, making the SAR analysis more conservative. Therefore, the plane crash into the pondcrete is judged to bound a crash into the tanks

Two accidents are evaluated in detail to determine if the consequences are within those determined for the bounding accidents presented in the Draft SAR. They are:

1) The spill of the entire contents of one 10000 gallon container inside of the tent structure. This would involve up to 4 $2x10^4$ kg of pond sludge releasing 0 04 kg to the atmosphere and

2) The spill of the entire contents of the vacuum truck onto the ground outside of the tent structure. This would involve $1x10^4$ kg of pond sludge releasing 0.01 kg to the atmosphere.

The results of the hazard analysis calculations are given in Table 1 for comparison with the Draft SAR calculations.

3.2.1 WASTE CHARACTERIZATION

Waste characterization for the Accelerated Sludge Removal Program is based on several reports as follows.

1) Pond Sludge Waste Characterization Report and Clarifier Sludge Waste Characterization Report for EG&G Rocky Flats Prepared by Halliburton NUS Environmental Corporation, March 1992

2) Weston Report

3) Options Analysis Report for the Accelerated Sludge Removal Project, Final Report, 234353GG Under MTS 225456RR, Prepared by ICF Kaiser Engineers, Inc July 26, 1993

The Weston and Halliburton chemical characterization data was treated together and a single conservative composition for each of the ponds, 207A, 207B-North, 207B-Center, and 207B-South was calculated. Since the sludge has now been all moved to the 207B-South pond a composite value is calculated based on the estimated sludge volumes for each pond. Since the A pond sludge has the highest concentration of hazardous materials, it is assumed, to be conservative, that all of the A Pond sludge can be placed in a single container (storage tank or vacuum truck) along with a composite of the three B Ponds to make up the balance of

the volume. These calculations are documented in Nuclear Safety Engineering Calculation 93-SAE-004

All of the hazardous material concentrations calculated for the sludge in the A/B Ponds to be remediated are less than those concentrations that are used in the Draft SAR for the bounding calculations.

3.2.2 RELEASE FRACTIONS

Release fractions for the spilling of the material were taken from NUREG/CR-4658, "Aerosols Generated By Spills of Viscous Solutions and Slurries", Prepared by M. Y. Ballinger and W. H. Hodgson, December 1986. A least squares fit of the release fraction as a function of viscosity was performed and the data extrapolated to 105 centipoise, the estimated viscosity of the stored sludge. The value used is the calculated value at 105 centipoise plus two standard deviations. This release fraction is 1.09 E-6.

3.2.3 ATMOSPHERIC DISPERSION

Local worker exposure assumes that the released material is uniformly contained in 1000 cubic meters of atmosphere. This is about one-third of the free air space in Tent 3 or 4. The draft SAR used 206 m^3 for the immediate worker dilution volume for the spill of 4.2 yd^3 (850 gallons) of pondcrete, a much smaller volume of material.

A colocated worker is assumed to be 100 meters downwind under the most conservative meteorology conditions, F Stability Class with a wind speed of 1 meter/second. The maximum exposed individual off-site is assumed to be 1900 meters with the same meteorology.

In comparison, the draft SAR used 100-200 meter range for the on site worker and 2000-2100 meter range for the off-site public dose calculations using the MACCS computer code. For the three accident conditions analyzed the draft SAR used D stability class and 4 meters/second wind speed, which is less conservative However, the draft SAR used F stability class and one meter/second wind speed for the Hazard Classification Calculations.

3.2.4 EXPOSURE CALCULATIONS

The aerosolized released fraction of material is assumed to occur instantaneously and persist for 15 minutes, allowing a peak 15 minute average concentration to be calculated. The concentration of each hazardous chemical is then compared to the threshold limit value - time weighted average (TLV-TWA) provided by the American Conference of Governmental Industrial Hygienists (ACGIH). The use of TLV-TWA is conservative for accident analysis purposes and is consistent with the methodology used in the Building 910 hazard

classification and SAR, which was approved by DOE. The TLV-TWA limits does not create any limitations for the 750 Pad operations and provides an additional margin of safety.
A safety fraction is calculated as the sum of the ratios of chemical concentration to the TLV-TWA. For public exposure one-tenth of the TLV-TWA was used in the calculation of the safety factor. These values are more conservative than those used in the draft SAR. The on-site worker and the public are assumed to be exposed to the hazardous material at the maximum concentration during the entire plume passage.

Radiological exposure is assumed to occur through inhalation of the radioactive material. The breathing rate for the exposed population from the draft SAR was used. Dose conversion factors were taken for specific radionuclides from the Federal Guidance Report No. 11, Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion. Gross alpha was assumed to be composed of plutonium-239 and gross beta plutonium-241. Exposure was calculated as the committed effective dose equivalent (CEDE).

The results of these exposure calculations are shown in Table 1 and are within the bounding envelope calculated in the Draft SAR.

4.0 CONCLUSIONS

The storage of sludge from the 207A/B ponds in tanks on the 750 Pad is within the safety envelope calculated for the storage of Pondcrete on the 750/904 Pads as presented in the Draft SAR.

TABLE 1

COMPARISON OF DRAFT SAR ACCIDENT ANALYSIS WITH EARLY REMEDIATION OF SOLAR POND HAZARD ANALYSIS

	SAR Hazard Classification	SAR Accidents Evaluated			Early Remediation of 207 A/B Solar Ponds - 750 Pad	
Exposed Individual Hazardous Chemical Radiological	Small Airplane Crash	Fork Lift Spill	30 Minute Fire	2 Hour Fire	10000 Gallon Tank Spill Inside Tent	Truck Spill Outside Tent
Worker Toxic Exposure Safety Fraction	N/A	25.7 [1] 0.445 [2]	N/A	N/A	0.77	0.61
Worker Radiation Exposure Rem (CEDE)	N/A	0.106	N/A	N/A	6.3×10^{-4}	5.9×10^{-4}
On-site Worker Toxic Exposure Safety Fraction	0 63	0 069	0 0014	2.9×10^{12}		0 035
On-site Worker Radiation Exposure Rem (CEDE)	0.0016	6×10^{-6}	3.6×10^{-7}	1×10^{-13}		$3\ 4 \times 10^{5}$
Off-site Person Toxic Exposure Safety Fraction	0 23	0.00048	8×10^{-5}	$4\ 4 \times 10^{17}$		0 0016
Off-site Person Radiation Exposure Rem (CEDE)	00026	$1\ 3 \times 10^{7}$	1.5×10^{7}	2.8×10^{16}		1.6×10^{-7}

Note 1 - Fraction against ERPG2
Note 2 - Fraction against ERPG3

BASIS FOR INTERIM OPERATION
750/904 Pads

INTRODUCTION

The 750/904 Pad are interim status Resource Conservation and Recovery Act (RCRA) units for temporary storage of pondcrete and saltcrete waste forms. These facilities support the efforts to remediate and close the Rocky Flats Plant Solar Evaporation Ponds, Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Operable Unit #4 (OU4).

Recent efforts to expedite closure of the solar ponds has identified the need to use the 750 Pad as the location for the installation of tanks which will contain the sludge and some liquids from the ponds

A draft Safety Analysis Report (SAR) has been developed for this facility and has been reviewed and commented on by the Department of Energy, Rocky Flats Office (DOE-RFO). This draft SAR meets 5480.23 criteria and categorizes the facility as Hazard Category 3.

FACILITY DESCRIPTION

he 750/904 Pad facilities consist of weatherproof fabric tents with arched aluminum frames. The tent structure are located on, and anchored to asphalt-paved areas. The perimeter of the Pad areas are bermed to collect drainage and runoff from the Pads. Pad modifications allow the storm water to be released to the storm sewer system. Primary facility systems include electrical power and lighting, propane fired heaters, and emergency communications

Two type of storage operations will be used for the pads, cemented pond and salt sludge materials in containers and sludge and liquids stored in 10000 gallon tanks.

The cemented waste storage operations include receipt, staging, stacking, inspection, storage, and loading (onto shipment vehicle) of pondcrete and saltcrete material. Pondcrete and saltcrete are immobilized low-level mixed waste forms. Pondcrete is cemented sludge from the solar evaporation ponds (Ponds 207A; 207B north, center, and south, and 207C), which are no longer used as evaporation basins per the Interagency Agreement with the DOE, the U S Environmental Protection Agency (EPA), and the State of Colorado Saltcrete is cemented nitrate salt residue from the dewatering/evaporation process at Building 374. Analytical sample data indicate the presence of trace amounts of volatile organic compounds; semi-volatile organic compounds; metals, including aluminum, beryllium, cadmium, chromium, lead, and mercury, and trace radioactive contaminants, including uranium-234, -235, -238, plutonium-239, americium-241, and tritium.

The liquid and sludge storage operation include the receipt, transfer, storage, and inspection of liquid or sludge material in 10000 gallon, double walled polyethylene tanks. The sludge materials originate from the 207A/B solar ponds as sludge or liquid materials.

SAFETY DOCUMENTATION/SAFETY ASSURANCE

The 750/904 Pads were originally classified as a low hazard facility per DOE Order AL 5481.1A, which did not require a separate SAR at the time and it was also classified as a non-nuclear facility per DOE Order 5480 5 However, the 750/904 Pad hazards have been evaluated and documented in a draft SAR, which categorized the facility as Hazard Category 3, and meets the scope and content requirements of DOE Order 5480.23. This draft SAR has been reviewed by DOE-RFO Resolution of outstanding issues and comments on this SAR are currently planned and budgeted for Fiscal Year 1994 (FY' 94) Continued operation of the facility in the interim until the SAR is finalized was justified in a letter from EG&G to DOE-RFO dated June 30, 1993. This justification was accepted by DOE in a letter to EG&G dated July 23, 1993. A Hazard Analysis for the Early Remediation of the Solar Ponds Project has concluded that the storage, in 10000 gallon tanks, of liquids and sludge taken from the 207A/B Ponds is within the safety envelope presented in the draft SAR.

The 750/904 Pads have specific health and safety plans. These plans address responsibilities, hazards, communications, site control, personnel protective equipment, decontamination, material handling, monitoring, training, and emergency response. In addition to the health and safety plans, Operational Safety Analyses and Job Safety Analyses have been performed for certain activities on the 750/904 Pads.

DOE conduct of operations requirements are implemented by the Conduct of Operation Manual. A Level of Applicability analysis performed for the 750/904 Pad operations determined that all Conduct of Operations Procedures are applicable.

With the restrictions mentioned above, the discussion in Section 4 3 of Appendix A is applicable to this building.

COMPLIANCE STATUS

The draft SAR/TSRs for the 750/904 Pads has been developed in accordance with DOE Orders 5480.23 and 5480.22. The SAR will require revision in FY 94 to incorporate 1) review comments from DOE-RFO, 2) the installation of tanks for the accelerated solar pond sludge removal project, and 3) reanalysis to resolve issues associated with LCO limitations on combustible material inventories

DOE has approved the funding of this effort and the resolution of the outstanding comments and issues should be accomplished in approximately 6 months

SAFETY ANALYSIS

The safety analyses performed for the 750/904 Pads is based on both qualitative and quantitative methods. Qualitative methods include OSAs, JSAs, and failure modes and effects analysis (FMEAs). Utilizing the results of the FMEAs, quantitative analyses were performed for those accidents of greater relative significance.

The 750/904 Pad is classified as a Hazard Category 3 nonreactor nuclear facility per DOE Order 5480.23. The hazard classification analysis considers a worst case bounding accident of an aircraft impact followed by fire. The design of the facility is such that no credit is taken for confinement. In addition to the hazard classification analysis, the SAR accident analysis considers spills, fire and explosions. The accident consequences were determined to be within DOE guideline for annual exposures for the immediate worker, the on-site worker, and the public.

RESTRICTIONS ON INTERIM OPERATIONS

The operational restrictions imposed by the letter justifying continued operation of the facility, as well as those imposed by the other programs discussed in Section 4.3 of Appendix A [of the Safety Analysis Program Implementation Plan], are being met.

CONCLUSION

The 750/904 Pad hazards have been evaluated and documented in a draft SAR, which categorizes the facility as Category 3, and meets the scope and content requirements of DOE Order 5480.23. This draft SAR has been reviewed by DOE-RFO Resolution of outstanding issues and comments on this SAR are currently planned and budgeted for Fiscal Year 1994 (FY 94). Continued operation of the facility in the interim until the SAR is finalized was justified in a letter from EG&G to DOE-RFO, dated June 30, 1993. This justification was accepted by DOE in a letter to EG&G dated July 23, 1993. A Hazard Analysis for the Early Remediation of the Solar Ponds has concluded that the storage, in 10000 gallon tanks, of liquids and sludge taken from the 207A/B Ponds is within the safety envelope presented in the draft SAR.

NUCLEAR SAFETY ENGINEERING CALCULATION COVER SHEET

Sheet 1 of 28 Sheets

Title Hazard Calculation for Early Remediation of Solar Ponds

Building 207 A/B Solar Ponds / 750 Pad

Project Work Package 12188 Calculation No 93-SAE-004

Analyzed System _____ Supersedes Calculation No _____

References _____

If Superseded, Give Superseding Calculation Number _____

Calculation Objective/Summary Description

Provide Safety Analysis for the Accelerated Solar Pond Sludge Removal and Storage in Tanks on the 750 Pad Project.

Computer Code

Dated Program Version _____

Operating System _____

Hardware Configuration _____

Rev No	Revision	Originator	Date	Checked By	Date	Approved By	Date
0	Original	J.C. Stalker	12/8/93	S. Layton	12/15/93	Don Swanson	12/15/93

NUCLEAR SAFETY ENGINEERING CALCULATION
TABLE OF CONTENTS

By [signature] Date 12/15/93 Sheet 2 of 28 Sheets

Calculation No 93-SAE-004

Checked By [signature] Date 12-15-93 Revision No 0

Additional Comments

GENERAL COMPUTATION SHEET Sheet 3 of 28 Sheets

☐ Calc No 93-SAE-004

Subject Hazard Calculations for Early Remediation of Solar Ponds

By J. Stalker Date 12/8/93 Chk By Rafat Date 12-15-93 Orig ☒ Rev ☐

1. Objective of Calculation

The objective of the calculation is to pull together the Halliburton NUS and Weston analytical data for the solar pond sludge and calculate the hazard for storing the material on the 750 pad in 10000 gallon tanks. These results will be compared to the 750 draft SAR accident calculations

2. Methodology

a. Combine the Weston and NUS Halliburton sludge analytical data for the A/B ponds The data consists of samples as follows:

A Pond	Weston	1 composite sample	
	NUS	1 sample	
B N Pond	Weston	4 Quadrant samples +	1 composite of 4 quadrants
	NUS	4 Quadrant samples	
B C Pond	Weston	4 Quadrat samples +	1 composite of 4 quadrant
	NUS	4 Quadrat samples	
B S Pond	Weston	4 Quadrat samples +	1 composite of 4 quadrants
	NUS	4 Quadrat samples +	1 duplicate quadrat

Weston
Calculate an average value for each pond
((NE + NW + SE + SW)/4 + composite)/2
NUS (NE + NW + SE + SW)/4 for duplicate calc average of one quadrant first

GENERAL COMPUTATION SHEET Sheet 4 of 28 Sheets

☐ Calc No 93-SAE-004

Subject Hazard Calculations for Early Remediation of Solar Ponds

By A C Stuthe Date 12/8/93 Chk By [illegible] Date 12-15-93 Ong ☒ Rev ☐

Weston data is calculated in EXCEL Spreadsheet PSSABC XLS
Hard copy is page 5 through 9 of this calculation

Halliburton NUS data is calculated in EXCEL Spreadsheet NUSPSLG.XLS. Hard copy is page 10 through 14 of this calculation.

The data is combined in EXCEL SPREADSHEET SLCOMB2 XLS
Hard copy is page 15 through 18 of this calculation.

The average value calculated for each of NUS and Weston are compared and the larger used for the conservative calculation.

a. NOTE. LESS than (nondetectable data) are shown as BOLD - UNDERLINED data on the Weston (PSSABC XLS) spreadsheet and BOLD data on the NUS (NUSPSLG.XLS) spreadsheet. They are coded as the less than value * the less than multiplier. For samples in which a given analyte was not detected in any of the samples for a given pond the value was left blank. For analytes in which no detectable value was found in any sample the analyte was deleted from the final combination spreadsheet (SLCOMB2.XLS)

b. Sludge volumes for each of the four Ponds A, BN, BC, & BS were given as: Based on Brown & Root Calculations per J.H Templeton

A	2181	gallons	which is 8255 liters
BN	87424	"	330900 liters
BC	91139	"	345000 liters
BS	48026	"	181800 liters

These values are used in EXCEL SPREADSHEET SLCOMB2 XLS to calculate a total conservative inventory for each of the analytes for each of the four ponds.

NEXT TEXT ON PAGE 23

	By [illegible] Date 12/15/93 Chk By [illegible] Date 12-15-93						
	Less than multiplier =		1	Weston Solar Pond Sludge Data			
Analyte	207A-CP-SL	207A	207BN-SW-SL	207BN SE SL	207BN NE SL	207BN NW SL	207BN-CP SL
	mg/kg	KG	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum	35700	3 63E+01	2960	2600	4340	2630	4140
Antimony		0 00E+00					
Arsenic		0 00E+00					
Barium	476	4 84E-01	134		144		
Beryllium	345	3 51E-01					
Boron		0 00E+00					
Cadmium	4730	4 81E+00	18 8	15 1	12 1	11 5	11 7
Calcium	72700	7 39E+01	256000	223000	263000	207000	247000
Chromium	2330	2 37E+00	24 2	17 5	31 2	70 6	33 2
Copper	1660	1 69E+00	15 3		18 9		
Iron	18400	1 87E+01	3370	2970	4800	2920	4530
Lead	265	2 70E-01	10 6	9 6	14 4	13 8	11 6
Lithium		0 00E+00					
Magnesium	15000	1 53E+01	4630	4000	5070	3960	4670
Manganese	257	2 61E-01	68 4	60 5	90 2	62 2	79 6
Mercury	160	1 63E-01					
Nickel	365	3 71E-01					
Potassium	12100	1 23E+01					
Silicon	22200	2 26E+01	1820	2270	1110	1400	2670
Silver	196	1 99E-01					
Sodium	20600	2 10E+01					
Strontium	770	7 83E-01	716	619	752	582	692
Thallium		0 00E+00					7 3
Zinc	677	6 89E-01	91 4	81 8	105	77 6	101
Total of above	2 09E+05	2 12E+02					
% Solids	11 2		23 2	26	23	23 7	25 7
Chloride			927	1540	1460	1490	1910
Fluoride							
Cyanide							
Sulfate							
Nitrite			46 06	1 5	92 12	9 212	32 9
Nitrate			2835 2	3809 8	1683 4	3455 4	2658
PO4--			3 4	2 4	8 9	2 8	4 1
Sulfide			8	16	32	24	56
Phosphorus			25	25	25	28	25
Ammonia(N)			24	16 3	23 8	15 2	102
Nitrogen(TKN)			5110	1240	1210	1140	1430
TOC %			1	1 1	1 4	0 96	1 1
Total							
Grand Total							
Sludge, Liters	8 26E+03						
Specific grav	1 10E+00						
Sludge, Kg Wet	9 08E+03						
	pCi/g (dry)	Ci	pCi/g (dry)	pCi/g (dry)	pCi/g (dry)	pCi/g (dry)	pCi/g (dry)
Gross alpha	5 10E+03	5 19E-03	28	32	28	38	33
Gross beta	1 40E+03	1 42E-03	38	43	41	42	46
U-234			19	14	13	14	13
U-235			0 55	0 3	0 35	0 31	0 41
U-238			12	9 6	8 9	9 3	8 4
Am-241							
Pu-239			2	4 2	6 2	11	2 2
			% Gross Alpha	% Gross Alpha	% Gross Alpha	% Gross Alpha	% Gross Alpha
U 234			67 86%	43 75%	46 43%	36 84%	39 39%
U 235			1 96%	0 94%	1 25%	0 82%	1 24%
U-238			42 86%	30 00%	31 79%	24 47%	25 45%
Am-241			0 00%	0 00%	0 00%	0 00%	0 00%
Pu-239			7 14%	13 13%	22 14%	28 95%	6 67%
Total			119 82%	87 81%	101 61%	91 08%	72 76%

Hazard Calculation for Early Remediation of Solar Ponds — Calc No 93-SAE-004 Sheet 6 of 28 Sheets

		By ACStalk Date 12/15/93 Chk By [illegible] Date 12-15-93					
		Weston Solar Pond Sludge Data					
	Average						Average
Analyte	207BN	207BN	207BC-SE-SL	207BC NE SL	207BC SW SL	207BC NW-SL	207BC-CP SL	207BC
	mg/kg	KG	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum	3 64E+03	3 59E+02	1680	1350	3070	2080	2350	2 20E+03
Antimony		0 00E+00						
Arsenic		0 00E+00						
Barium	1 39E+02	1 37E+01						
Beryllium		0 00E+00	10 9	9 5	12 3	9 8	9 4	1 00E+01
Boron		0 00E+00						
Cadmium	1 30E+01	1 29E+00	110	59 3	93 5	71 6	108	9 58E+01
Calcium	2 42E+05	2 39E+04	148000	92000	153000	74300	108000	1 12E+05
Chromium	3 45E+01	3 41E+00	82 3	50 6	390	56 8	127	1 36E+02
Copper	1 71E+01	1 69E+00	83 7	64 6	103	71 2	96 3	8 85E+01
Iron	4 02E+03	3 97E+02	2140	1680	3470	2370	2650	2 53E+03
Lead	1 19E+01	1 17E+00	12 4	10 2	14 4	12 3	12 9	1 26E+01
Lithium		0 00E+00						
Magnesium	4 54E+03	4 48E+02	11300	12200	13600	10300	13700	1 28E+04
Manganese	7 50E+01	7 39E+00	80 7	104	163	124	208	1 63E+02
Mercury		0 00E+00	3 5	1 4	5 3	3 6	1 5	2 48E+00
Nickel		0 00E+00						
Potassium		0 00E+00	9420	9890				9 66E+03
Silicon	2 16E+03	2 13E+02	2940	3090	3000	2550	2690	2 79E+03
Silver		0 00E+00						
Sodium		0 00E+00	32600	33000	35500	28800	31300	3 19E+04
Strontium	6 80E+02	6 70E+01	880	739	946	575	848	8 17E+02
Thallium	7 30E+00	7 20E-01						
Zinc	9 50E+01	9 37E+00	110	144	277	197	186	1 84E+02
Total of above	2 58E+05	2 54E+04						1 76E+05
% Solids	2 48E+01		8 5	8 3	7 9	8 3	10	9 13E+00
Chloride	1 63E+03	1 61E+02	9900	16600	11400	18200	11200	1 26E+04
Fluoride		0 00E+00						
Cyanide		0 00E+00	11 8	12	12 7	15 1	10	1 15E+01
Sulfate		0 00E+00	7120	10700	6460	13800	6950	8 24E+03
Nitrite	3 51E+01	3 46E+00	888 3	1743 7	1019 9	1710 8	1546 3	1 44E+03
Nitrate	2 80E+03	2 76E+02	41642	57590	37212	57590	57590	5 30E+04
PO4---	4 24E+00	4 18E-01	21	19	20	17	14	1 66E+01
Sulfide	3 80E+01	3 75E+00						
Phosphorus	2 54E+01	2 50E+00	1400	1800	2800	2400	2100	2 10E+03
Ammonia(N)	6 09E+01	6 01E+00	182	154	199	181	135	1 57E+02
Nitrogen(TKN)	1 80E+03	1 78E+02	22700	18200	21300	17600	16700	1 83E+04
TOC %	1 11E+00		3	2 1	1 6	1 7	2 2	2 15E+00
Total	6 40E+03	6 31E+02						9 60E+04
Grand Total	2 64E+05	2 60E+04						2 72E+05
Sludge, Liters	3 31E+05							3 45E+05
Specific grav	1 20E+00							1 00E+00
Sludge, Kg Wet	3 97E+05							3 45E+05
	pCi/g (dry)	Ci	pCi/g (dry)	pCi/g (dry)	pCi/g (dry)	pCi/g (dry)	pCi/g (dry)	pCi/g (dry)
Gross alpha	3 23E+01	3 18E-03	120	120	130	120	120	1 21E+02
Gross beta	4 35E+01	4 29E-03	340	320	370	270	380	3 53E+02
U-234	1 40E+01	1 38E-03	86	85	69	71	70	7 39E+01
U-235	3 94E-01	3 88E-05	2 4	3	2	2 1	2 5	2 44E+00
U-238	9 18E+00	9 05E-04	88	94	76	78	75	7 95E+01
Am-241		0 00E+00			1 2	5 1		3 15E+00
Pu-239	4 03E+00	3 97E-04	7 2	3 4	0 18	2 3	5 1	4 19E+00
	% Gross Alpha		% Gross Alpha	% Gross Alpha	% Gross Alpha	% Gross Alpha	% Gross Alpha	% Gross Alph
U-234	43 41%		71 67%	70 83%	53 08%	59 17%	58 33%	60 93%
U-235	1 22%		2 00%	2 50%	1 54%	1 75%	2 08%	2 01%
U 238	28 45%		73 33%	78 33%	58 46%	65 00%	62 50%	65 57%
Am-241	0 00%		0 00%	0 00%	0 92%	4 25%	0 00%	2 60%
Pu-239	12 48%		6 00%	2 83%	0 14%	1 92%	4 25%	3 45%
Total	85 56%		153 00%	154 50%	114 14%	132 08%	127 17%	134 55%

Excel File PSSABC XLS

Hazard Calculation for Early Remediation of Solar Ponds Calc No 93-SAE-004 Sheet 7 of 28 Sheets

By A C Stelle Date 12/15/93 Chk By [illegible] Date 12-15-93

Weston Solar Pond Sludge Data

Analyte	207BC	207BS-SE-SL	207BS-NE-SL	207BS SW SL	207BS NW SL	207BS CP SL	Average 207BS	207BS
	KG	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	KG
Aluminum	6 92E+01	1510	1680	2390	2260	1870	1 92E+03	4 96E+01
Antimony	0 00E+00							0 00E+00
Arsenic	0 00E+00							0 00E+00
Barium	0 00E+00							0 00E+00
Beryllium	3 15E-01							0 00E+00
Boron	0 00E+00	146	124	59 4	154	138	1 29E+02	3 36E+00
Cadmium	3 02E+00	18 9	27 5	18 8	23 9	28 2	2 52E+01	6 54E-01
Calcium	3 54E+03	157000	131000	95600	76000	124000	1 19E+05	3 10E+03
Chromium	4 28E+00	30 7	35 8	27 7	23 3	30	2 97E+01	7 70E 01
Copper	2 78E+00	76 7	96	137	210	95 2	1 13E+02	2 92E+00
Iron	7 97E+01	2160	2420	3690	3490	2530	2 74E+03	7 09E+01
Lead	3 97E-01		11 3	21 1		9 4	1 28E+01	3 32E 01
Lithium	0 00E+00							0 00E+00
Magnesium	4 02E+02	9760	11300	11900	10600	9680	1 03E+04	2 67E+02
Manganese	5 13E+00	75 2	107	186	204	107	1 25E+02	3 24E+00
Mercury	7 79E 02							0 00E+00
Nickel	0 00E+00							0 00E+00
Potassium	3 04E+02	6600	7700	7970	9580	7370	7 67E+03	1 99E+02
Silicon	8 79E+01	3750	4190	5070	4790	4320	4 39E+03	1 14E+02
Silver	0 00E+00	12 8	12 4	5 9	25 9	10 4	1 23E+01	3 19E 01
Sodium	1 00E+03	23800	26500	28800	32800	24200	2 61E+04	6 76E+02
Strontium	2 57E+01	734	762	650	575	720	7 00E+02	1 81E+01
Thallium	0 00E+00							0 00E+00
Zinc	5 79E+00	80 6	133	234	300	126	1 56E+02	4 06E+00
Total of above	5 53E+03						1 74E+05	4 51E+03
% Solids		13 7	12 2	13 6	10 2	13 5	1 30E+01	
Chloride	3 97E+02	8600	17200	11600	13300	11300	1 20E+04	3 11E+02
Fluoride	0 00E+00							0 00E+00
Cyanide	3 60E-01	58 8	74 1	8 7	15 4	7 4	3 93E+01	1 02E+00
Sulfate	2 59E+02	6380	12800	6190	8070	8530	8 45E+03	2 19E+02
Nitrite	4 54E+01	5593	3948	3948	2829 4	2829 4	3 45E+03	8 95E+01
Nitrate	1 67E+03	42528	53160	84170	66450	48730	5 52E+04	1 43E+03
PO4---	5 23E-01	42	24	7 5	3 8	23	2 12E+01	5 49E 01
Sulfide	0 00E+00							0 00E+00
Phosphorus	6 61E+01	220	68	5700	5300	260	1 54E+03	3 99E+01
Ammonia(N)	4 94E+00	585	271	352	393	256	3 28E+02	8 51E+00
Nitrogen(TKN)	5 77E+02	12200	13700	16400	15000	12100	1 32E+04	3 42E+02
TOC %		2 3	2 1	2 3	1 5	2 1	2 08E+00	
Total	3 02E+03						9 42E+04	2 44E+03
Grand Total	8 55E+03						2 68E+05	6 95E+03
Sludge, Liters							1 82E+05	
Specific grav							1 10E+00	
Sludge, Kg Wet							2 00E+05	
	Ci	pCi/g (dry)	pCi/g (dry)	pCi/g (dry)	pCi/g (dry)	pCi/g (dry)	pCi/g (dry)	Ci
Gross alpha	3 82E-03	220	220	150	200	150	1 74E+02	4 50E 03
Gross beta	1 11E-02	730	620	380	520	530	5 46E+02	1 42E 02
U-234	2 33E-03	160	76	71	0 04	130	1 03E+02	2 68E 03
U-235	7 67E-05	5 1	2 5	2 5	1 6	2 9	2 91E+00	7 55E 05
U 238	2 50E-03	190	84	80	0 04	150	1 19E+02	3 09E 03
Am 241	9 92E-05	0 75	2 4		1 2	2 4	1 93E+00	4 99E 05
Pu-239	1 32E-04	6 9	23	5 7	7 4	1 9	6 33E+00	1 64E 04
		% Gross Alpha	% Gross Alpha	% Gross Alpha	% Gross Alpha	% Gross Alpha	% Gross Alpha	
U-234		72 73%	34 55%	47 33%	0 02%	86 67%	59 50%	
U 235		2 32%	1 14%	1 67%	0 80%	1 93%	1 68%	
U 238		86 36%	38 18%	53 33%	0 02%	100 00%	68 64%	
Am-241		0 34%	1 09%	0 00%	0 60%	1 60%	1 11%	
Pu-239		3 14%	10 45%	3 80%	3 70%	1 27%	3 64%	
Total		164 89%	85 41%	106 13%	5 14%	191 47%	134 56%	

Excel File PSSABC XLS

	By [illegible] Date 12/15/93 Chk By [illegible] Date 12/15/93						
			Weston Solar Pond Sludge Data				
Analyte	207C-NW-SL	207C-NE SL	207C-SW-SL	207C SE SL	207C CP SL	Average 207C	207C
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	KG
Aluminum	69 5	132	1330	82 4	97 2	2 50E+02	0 00E+00
Antimony	10 1	12 1	13 8	12 1	13	1 25E+01	0 00E+00
Arsenic	2 2	2	2 7	2	2	2 11E+00	0 00E+00
Barium							0 00E+00
Beryllium	0 85	1 1	17 6	1	1 1	3 12E+00	0 00E+00
Boron	78 9	119	1390	103	117	2 70E+02	0 00E+00
Cadmium	3 2	5 8	116	4 5	5 6	1 90E+01	0 00E+00
Calcium	845	1010	1550	1010	1080	1 09E+03	0 00E+00
Chromium	16	21 6	365	19 2	17 6	6 15E+01	0 00E+00
Copper	4 3	5 8	78	5 1	6 3	1 48E+01	0 00E+00
Iron	24 2	55 4	211	34 9	36	5 87E+01	0 00E+00
Lead	0 66	0 51	2	0 61	0 59	7 68E 01	0 00E+00
Lithium	24	36 9	108	32 7	42 8	4 66E+01	0 00E+00
Magnesium							0 00E+00
Manganese	2 5	3	8 7	3	3 3	3 80E+00	0 00E+00
Mercury	0 17	0 17	0 27	0 11	0 11	1 45E 01	0 00E+00
Nickel	6 8	8 1	23 1	8 1	8 7	1 01E+01	0 00E+00
Potassium	224000	365000	16900	327000	273000	2 53E+05	0 00E+00
Silicon	506	862	6990	607	422	1 33E+03	0 00E+00
Silver	1 7	2	4 4	2	2 2	2 36E+00	0 00E+00
Sodium	36900	49200	378000	45800	50900	8 92E+04	0 00E+00
Strontium							0 00E+00
Thallium							0 00E+00
Zinc	5 5	7 3	18 9	4	5 5	7 21E+00	0 00E+00
Total of above						3 45E+05	0 00E+00
% Solids	91	90 1	77 9	89 9	92 3		
Chloride	2860	2420	6890	2830	5360	4 56E+03	0 00E+00
Fluoride	6320	11700	29800	14800	22800	1 92E+04	0 00E+00
Cyanide	2 2	1 6	5 2	9 9	3 2	3 96E+00	0 00E+00
Sulfate	28800	53900	141000	68300	110000	9 15E+04	0 00E+00
Nitrite	1579 2	3290	1710 8	1776 6	2632	2 36E+03	0 00E+00
Nitrate	443000	287950	575900	443000	429710	4 34E+05	0 00E+00
PO4 --							
Sulfide							
Phosphorus	1600	1300	3400	1400	1700	1 81E+03	0 00E+00
Ammonia(N)	2 7	2 7	4 5	2 8	3 4	3 29E+00	0 00E+00
Nitrogen(TKN)							0 00E+00
TOC %							
Total						5 53E+05	0 00E+00
Grand Total						8 99E+05	0 00E+00
Sludge, Liters							
Specific grav							
Sludge, Kg Wet							
	pCi/g (dry)	pCi/g (dry)	pCi/g (dry)	pCi/g (dry)	pCi/g (dry)	pCi/g (dry)	Ci
Gross alpha	29	180	1200	25	18	1 88E+02	0 00E+00
Gross beta	500	390		420	420	4 28E+02	0 00E+00
U-234	11	0 06	9 2	0 011	5 2	5 13E+00	0 00E+00
U 235	0 36	0 098	0 4	0 016	0 84	5 29E 01	0 00E+00
U-238	16	5 3	14	1 3	31	2 01E+01	0 00E+00
Am-241	0 78	0 56	0 011	0 6	1 7	1 09E+00	0 00E+00
Pu-239	16			2 8	15	1 22E+01	0 00E+00
	% Gross Alpha	% Gross Alpha	% Gross Alpha	% Gross Alpha	% Gross Alpha	% Gross Alpha	
U-234	37 93%	0 03%	0 77%	0 04%	28 89%	2 73%	
U 235	1 24%	0 05%	0 03%	0 06%	4 67%	0 28%	
U-238	55 17%	2 94%	1 17%	5 20%	172 22%	10 66%	
Am 241	2 69%	0 31%	0 00%	2 40%	9 44%	0 58%	
Pu 239	55 17%	0 00%	0 00%	11 20%	83 33%	6 48%	
Total	152 21%	3 34%	1 97%	18 91%	298 56%	20 73%	

	By [illegible] Date 12/15/93 Chk By [illegible] Date 12-15-93					
		Weston Solar Pond Sludge Data				
	Total	Total	Ponds A/B	Ponds A/B		
Analyte	In Ponds	In Ponds	Composite	Composite	TLV TWA	
	KG	Pounds	KG	mg/kg	mg/m3	
Aluminum	4 45E+02	9 80E+02	2 91E+03	3 06E+03	2	as Al soulble salts
Antimony	0 00E+00	0 00E+00	0 00E+00	0 00E+00	0 5	as Sb counpounds
Arsenic	0 00E+00	0 00E+00	0 00E+00	0 00E+00	0 2	as As
Barium	1 42E+01	3 13E+01	5 95E+01	6 26E+01	0 5	as Ba
Beryllium	3 51E-01	7 74E-01	6 59E+00	6 93E+00	0 002	as Be
Boron	3 36E+00	7 40E+00	2 59E+01	2 72E+01	1	as borate
Cadmium	6 75E+00	1 49E+01	8 62E+01	9 07E+01		
Calcium	2 70E+04	5 96E+04	1 59E+05	1 68E+05	10	as carbonate or silicate
Chromium	6 55E+00	1 44E+01	8 77E+01	9 22E+01	0 05	as Cr (VI)
Copper	6 29E+00	1 39E+01	7 49E+01	7 87E+01	1	as Cu dust & mist
Iron	4 86E+02	1 07E+03	3 18E+03	3 35E+03	1	as Fe soluble salts
Lead	1 77E+00	3 90E+00	1 40E+01	1 47E+01	0 15	as Pb inorg dust & fumes
Lithium	0 00E+00	0 00E+00	0 00E+00	0 00E+00	10	only limit listed for LiH4
Magnesium	7 30E+02	1 61E+03	8 40E+03	8 84E+03	10	MgO fume
Manganese	1 09E+01	2 40E+01	1 13E+02	1 19E+02	5	as Mn dust & compounds
Mercury	1 63E 01	3 59E-01	2 31E+00	2 43E+00	0 01	as Hg skin & alkyl compounds
Nickel	3 71E 01	8 18E-01	3 31E+00	3 48E+00	1	as Ni insoluble compounds
Potassium	2 11E+02	4 65E+02	4 97E+03	5 23E+03	2	as KOH
Silicon	3 49E+02	7 70E+02	2 90E+03	3 05E+03	10	precipitated silica
Silver	5 19E-01	1 14E+00	4 24E+00	4 46E+00	0 01	as Ag
Sodium	6 97E+02	1 54E+03	1 64E+04	1 72E+04	2	as NaOH
Strontium	8 60E+01	1 90E+02	6 99E+02	7 34E+02	10	not listed
Thallium	7 20E-01	1 59E+00	2 90E+00	3 05E+00		
Zinc	1 41E+01	3 11E+01	1 39E+02	1 46E+02	10	ZnO dust
Total of above	3 01E+04	6 64E+04	2 00E+05	2 10E+05		
% Solids						
Chloride	4 72E+02	1 04E+03	7 40E+03	7 78E+03		
Fluoride	0 00E+00	0 00E+00	0 00E+00	0 00E+00	2 5	as F, fluorides
Cyanide	1 02E+00	2 24E+00	1 18E+01	1 24E+01	5	as CN
Sulfate	2 19E+02	4 83E+02	4 53E+03	4 76E+03		
Nitrite	9 30E+01	2 05E+02	1 20E+03	1 26E+03		
Nitrate	1 71E+03	3 76E+03	3 04E+04	3 20E+04		
PO4---	9 67E-01	2 13E+00	1 17E+01	1 22E+01		
Sulfide	3 75E+00	8 26E+00	1 51E+01	1 59E+01		
Phosphorus	4 24E+01	9 36E+01	1 04E+03	1 10E+03		
Ammonia(N)	1 45E+01	3 20E+01	1 44E+02	1 51E+02	17	as NH3
Nitrogen(TKN)	5 20E+02	1 15E+03	9 68E+03	1 02E+04		
TOC %						
Total	3 07E+03	6 77E+03	5 45E+04	5 73E+04		
Grand Total	3 32E+04	7 32E+04	2 54E+05	2 67E+05		
Sludge, Liters			8 66E+05			
Specific grav			1 10E+00			
Sludge, Kg Wet			9 51E+05			
	Ci		Ci	pCi/g (dry)		
Gross alpha	1 29E-02		1 36E-01	1 43E+02		
Gross beta	1 99E 02		2 61E-01	2 74E+02		
U-234	4 06E-03		5 17E-02	5 44E+01		
U-235	1 14E-04		1 58E 03	1 66E+00		
U 238	4 00E-03		5 49E-02	5 77E+01		
Am 241	4 99E-05		1 47E-03	1 55E+00		
Pu 239	5 61E-04		4 31E-03	4 53E+00		
			% Gross Alph	% Gross Alpha		
U 234			38 12%	38 12%		
U 235			1 16%	1 16%		
U-238			40 47%	40 47%		
Am 241			1 08%	1 08%		
Pu 239			3 17%	3 17%		
Total			84 01%	84 01%		

		Less than multiplier =		1 0	Halliburton NUS Data Sampled August 1991				
Analyte	PS207A NE	PS207A	PS207BN NE	PS207BN NW	PS207BN-SE	PS207BN SW	Average PS207BN	Average PS207BN	PS207BC-NE
	mg/kg	KG	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	KG	mg/kg
1,1,1-Trichloroethane	0 024	2 18E-04							
2 Butanone									
Benzene									
Trichlorotrifluoroethane	0 26	2 36E-03							
Tetrachloroethylene	0 29	2 63E 03							
Trichloroethylene	0 029	2 63E-04							
Pyrene									
Arsenic	40 2	4 6E-02	16 7	17 2	14 2	16 5	16	1 6E+00	39 6
Barium	210	2 4E-01	89 1	111	105	116	1 05E+02	1 04E+01	46 5
Boron	84 3	9 7E-02	18	14 2	13 5	12 8	1 46E+01	1 45E+00	151
Cadmium	1300	1 5E+00	6 7	6 9	8 5	12 8	8 73E+00	8 63E 01	46 5
Calcium									
Chromium	658	7 59E-01	7 9	31 9	33 3	19 8	2 32E+01	2 30E+00	9 9
Lead	89	1 03E-01	13 8	14 2	21 3	14	1 58E+01	1 57E+00	29 7
Magnesium	11400	1 32E+01	3270	3940	3850	4160	3 81E+03	3 76E+02	7190
Mercury	0 8	9 2E-04	0 8	0 7	0 3	0 4	5 50E-01	5 44E-02	0 9
Nickel	102	1 18E-01	8 4	9 5	7 1	8 2	8 30E+00	8 21E-01	19 8
Potassium	7340	8 5E+00	1260	1350	1550	1350	1 4E+03	1 4E+02	9800
Selenium	47 2	5 4E-02	25 1	25 9	21 3	24 7	24	2 4E+00	59 4
Silver	45 7	5 3E-02	2 5	2 6	2 1	2 5	2	2 4E 01	5 9
Sodium	14500	1 67E+01	1830	1990	1640	1850	1 8E+03	1 8E+02	35200
Ammonia	36	4 15E 02	20	23	35	9 8	2 20E+01	2 17E+00	25
CN	1 6	1 85E 03	0 25	0 25	0 25	0 25	2 5E-01	2 5E 02	0 34
Cl	400	4 62E-01	260	80	160	480	2 45E+02	2 42E+01	4400
NO3-	700	8 08E-01	174	34	196	140	1 36E+02	1 35E+01	1400
SO4=	400	4 62E-01	3200	3200	3000	3000	3 10E+03	3 07E+02	740
Total Organic Carbon	14000	1 62E+01	3300	3200	3400	3000	3 23E+03	3 19E+02	8800
Total		5 93E+01						1 38E+03	
Moisture - Gravimetric %	87 3	7 93E+03	76 1	76 8	71 8	75 7	75 1	2 98E+05	89 9
Moisture - Karl Fisher %	34		23 5	25 3	25 7	27 9	25 6		42
Specific Gravity	1 1		1 2	1 2	1 2	1 2	1 2		1
	pCi/g	Curies	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	Curies	pCi/g
Gross Alpha - pCi/g	570	6 58E 04	9 4	5 2	11	10	8 90E+00	8 80E-04	19
Gross Beta - pCi/g	95	1 10E 04	5 4	5 1	8 8	9 8	7 28E+00	7 20E-04	16
Sludge Liters	8 26E+03						3 31E+05		
Sludge Dry Weight, KG	1 15E+03						9 89E+04		
Sludge Weight KG	9 09E+03	7 99E+03					3 97E+05	3 00E+05	
Sludge Volume gallons	2 18E+03						8 75E+04		
# of 10000 gallon tanks	0 22						9		

				Less than multiplier =	1 0			
				Average	Average			
Analyte	PS207BC-NW	PS207BC-SE	PS207BC-SW	PS207BC	PS207BC	PS207BS-NE	PS207BS-NW	PS207BS-NWD
	mg/kg	mg/kg	mg/kg	mg/kg	KG	mg/kg	mg/kg	mg/kg
1,1,1 Trichloroethane								
2-Butanone								
Benzene								
Trichlorotrifluoroethane								
Tetrachloroethylene						0 46	0 21	0 26
Trichloroethylene								
Pyrene								
Arsenic	60 6	44 4	43 5	47	1 4E+00	34 2	50 6	59 7
Barium	120	86 7	76 1	8 23E+01	2 48E+00	80 3	124	134
Boron	138	131	97 8	1 29E+02	3 90E+00	336	106	112
Cadmium	53	84 4	47 8	5 79E+01	1 74E+00	26 5	30 4	28 6
Calcium								
Chromium	48 5	68 9	130	6 43E+01	1 94E+00	41 9	51 9	45 5
Lead	45 5	33 3	32 6	35	1 1E+00	25 6	38	61
Magnesium	19800	11900	10700	1 24E+04	3 73E+02	10200	13800	15200
Mercury	5 5	1 1	1 1	2 15E+00	6 47E-02	0 9	1	5
Nickel	30 3	22 2	21 7	24	7 1E-01	17 1	25 3	26
Potassium	15400	11700	10900	1 20E+04	3 60E+02	8910	12100	12900
Selenium	90 9	66 7	65 2	7 1E+01	2 1E+00	51 3	75 9	77 9
Silver	27 3	6 7	10 9	1 3E+01	3 8E-01	5 1	26 6	40 3
Sodium	54200	40200	38100	4 19E+04	1 26E+03	30000	42100	44600
Ammonia	46	42	58	4 28E+01	1 29E+00	10	17	22
CN-	0 52	1 3	0 38	6 35E-01	1 91E 02	0 72	4 1	0 89
Cl-	6000	4000	4200	4 65E+03	1 40E+02	4000	4000	4000
NO3-	1000	1480	1400	1 32E+03	3 97E+01	1780	1540	1780
SO4 =	1800	680	660	9 70E+02	2 92E+01	600	800	720
Total Organic Carbon	5500	8300	6800	7 35E+03	2 21E+02	9200	11000	6800
Total					2 44E+03			
Moisture - Gravimetric %	93 4	91	90 8	91 275	3 15E+05	88 3	92 1	92 3
Moisture Karl Fisher %	53	47	51	48 25		43	50	
Specific Gravity	1	1	1	1		1 1	1	
	pCi/g	pCi/g	pCi/g	pCi/g	Curies	pCi/g	pCi/g	pCi/g
Gross Alpha - pCi/g	13	19	16	1 68E+01	5 04E 04	61	32	31
Gross Beta pCi/g	14	16	12	1 45E+01	4 36E 04	47	24	22
Sludge Liters				3 45E+05				
Sludge Dry Weight, KG				3 01E+04				
Sludge Weight KG				3 45E+05	3 17E+05			
Sludge Volume gallons				9 11E+04				
# of 10000 gallon tanks				10				

			Less than multiplyer =	1 0				
			Average	Average	Combined	Combined	Combined	Combined
Analyte	PS207BS-SE	PS207BS SW	PS207BS	PS207BS	B Ponds	A/B Ponds	A/B Ponds	A/B Ponds
	mg/kg	mg/kg	mg/kg	KG	KG	KG	mg/kg	Pounds
1,1,1-Trichloroethane					0 00E+00	2 18E-04	2 30E-04	4 80E 04
2 Butanone					0 00E+00			
Benzene					0 00E+00			
Trichlorotrifluoroethane					0 00E+00	2 36E 03	2 49E-03	5 20E-03
Tetrachloroethylene	0 23	0 032	0 24	4 68E-02	4 68E 02	4 94E-02	5 22E-02	1 09E-01
Trichloroethylene					0 00E+00	2 63E-04	2 78E-04	5 80E-04
Pyrene					0 00E+00			
Arsenic	37	36	4 06E+01	8 22E 01	3 83E+00	3 88E+00	4 10E+00	8 55E+00
Barium	133	62 2	1 01E+02	2 05E+00	1 49E+01	1 52E+01	1 60E+01	3 34E+01
Boron	77 8	349	2 18E+02	4 41E+00	9 76E+00	9 85E+00	1 04E+01	2 17E+01
Cadmium	7 4	20 7	2 10E+01	4 26E-01	3 03E+00	4 53E+00	4 79E+00	9 98E+00
Calcium						0 00E+00	0 00E+00	0 00E+00
Chromium	25 9	25 2	3 54E+01	7 17E 01	4 95E+00	5 71E+00	6 03E+00	1 26E+01
Lead	27 8	27	3 25E+01	6 58E-01	3 28E+00	3 39E+00	3 58E+00	7 46E+00
Magnesium	5140	8170	9 50E+03	1 92E+02	9 42E+02	9 55E+02	1 01E+03	2 10E+03
Mercury	1	0 9	1 5	2 9E-02	1 48E 01	1 49E-01	1 58E-01	3 29E-01
Nickel	18 5	18	20	4 0E-01	1 93E+00	2 05E+00	2 16E+00	4 51E+00
Potassium	5580	8800	8 95E+03	1 81E+02	6 77E+02	6 86E+02	7 24E+02	1 51E+03
Selenium	55 6	54 1	59	1 2E+00	5 73E+00	5 78E+00	6 10E+00	1 27E+01
Silver	5 6	5 4	12	2 5E 01	8 73E 01	9 26E 01	9 78E 01	2 04E+00
Sodium	4080	31200	2 72E+04	5 50E+02	1 99E+03	2 01E+03	2 12E+03	4 43E+03
Ammonia	34	21	2 11E+01	4 28E 01	3 89E+00	3 93E+00	4 15E+00	8 65E+00
CN	0 55	0 46	1 06E+00	2 14E 02	6 52E 02	6 71E 02	7 08E 02	1 48E 01
Cl	4000	4000	4000	8 1E+01	2 45E+02	2 46E+02	2 59E+02	5 41E+02
NO3	1720	1600	1 69E+03	3 42E+01	8 74E+01	8 82E+01	9 32E+01	1 94E+02
SO4=	620	460	6 10E+02	1 24E+01	3 48E+02	3 49E+02	3 68E+02	7 68E+02
Total Organic Carbon	8400	7800	8 58E+03	1 74E+02	7 14E+02	7 30E+02	7 71E+02	1 61E+03
Total				1 24E+03	5 06E+03	5 12E+03	5 40E+03	1 13E+04
Moisture - Gravimetric %	89 2	88 9	89 65	1 75E+05	8 41E 01	7 97E+05	8 41E+01	1 75E+06
Moisture - Karl Fisher %	39	49	39					
Specific Gravity	1 1	1 1	1 075		1 09E+00	1 09E+00		
	pCi/g	pCi/g	pCi/g	Curies	Curies	Curies		
Gross Alpha - pCi/g	37	31	4 01E+01	8 13E-04	2 20E 03	2 85E-03		
Gross Beta - pCi/g	22	21	2 83E+01	5 72E 04	1 73E 03	1 84E-03		
Sludge Liters			1 82E+05		8 58E+05	8 66E+05	Gallons =	2 29E+05
Sludge Dry Weight, KG			2 02E+04		1 49E+05	1 50E+05		
Sludge Weight KG			1 96E+05	1 77E+05	9 38E+05	9 47E+05		2 09E+06
Sludge Volume gallons			4 81E+04		2 27E+05	2 29E+05		
# of 10000 gallon tanks			5			23		23

		Less than multiplyer =	1 0				
	Composite	Composite				Average	Average	
Analyte	PS207C	Berm 207C	PS207C NW	PS207C NWD	PS207C-SW	PS207C	PS207C	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	KG	
1,1,1-Trichloroethane								
2-Butanone	0 016	0 074	0 16	0 16	0 14	8 30E-02	1 72E-01	
Benzene	0 015				0 031	1 50E-02	3 11E-02	
Trichlorotrifluoroethane								
Tetrachloroethylene	0 011	0 073	0 009	0 008	0 01	1 01E-02	2 10E-02	
Trichloroethylene				0 007	0 005	6 00E-03	1 24E-02	
Pyrene	0 19	0 32				1 90E-01	3 93E-01	
Arsenic	23 9	35	37	18	26 2	2 54E+01	3 16E+01	
Barium	23	61 5	13 2	32 2	25 2	2 35E+01	2 92E+01	
Boron	455	693	594	781	536	5 33E+02	6 64E+02	
Cadmium	67 3	665	28 9	31 8	27 3	4 81E+01	5 98E+01	
Calcium								
Chromium	572	960	252	718	586	5 54E+02	6 89E+02	
Lead	12 9	38 5	7 9	19 1	18 4	1 44E+01	1 80E+01	
Magnesium	2410	6250	1340	3690	3160	2 62E+03	3 27E+03	
Mercury	1	1	0 8	0 8	0 7	8 75E-01	1 09E+00	
Nickel	33 6	146	17 4	30 5	34 2	3 13E+01	3 90E+01	
Potassium	87200	64500	82000	81200	75700	8 29E+04	1 03E+05	
Selenium	46	112	58 1	117	51 1	5 77E+01	7 18E+01	
Silver	58 6	73 6	35 1	54 1	49 2	5 28E+01	6 57E+01	
Sodium	144000	150000	19300	162000	139000	1 29E+05	1 61E+05	
Ammonia	10	10	10	10	10	1 00E+01	1 24E+01	
CN	13	14	170	150	14	5 00E+01	6 22E+01	
Cl	14800	14600	13200	19800	15000	1 53E+04	1 90E+04	
NO3	220000	178000	200000	200000	200000	2 10E+05	2 61E+05	
SO4 =	26000	17600	18800	16200	18000	2 19E+04	2 72E+04	
Total Organic Carbon	9000	8800	6400	7300	7200	8 01E+03	9 97E+03	
Total	5 05E+05	4 43E+05	3 42E+05	4 92E+05	4 59E+05	4 72E+05	5 87E+05	
Moisture - Gravimetric %	34 8	46 5	48 4	48 8	41 3	3 99E+01	8 25E+05	
Moisture - Karl Fisher %								
Specific Gravity						1 80E+00		
	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	Curies	
Gross Alpha - pCi/g	4500	5900	2700	3100	8700	5 15E+03	6 41E+00	
Gross Beta - pCi/g	660	810	470	420	1200	7 41E+02	9 23E-01	
Sludge Liters						1 15E+06		
Sludge Dry Weight KG						1 24E+06		
Sludge Weight KG						2 07E+06	1 41E+06	
Sludge Volume gallons						3 04E+05		
# of 10000 gallon tanks						31		

Analyte	CS-001	CS-001D	CS-002	CS 003	Average Clarifyer Sludge	Average Clarifyer Sludge
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	KG
1,1,1-Trichloroethane	0 026	0 009	0 018	0 029	2 15E 02	1 30E 03
2 Butanone	0 18	0 092	0 087	0 13	1 18E-01	7 10E 03
Benzene						
Trichlorotrifluoroethane	0 1	0 073	0 045	0 15	9 38E-02	5 66E 03
Tetrachloroethylene	1	0 28	0 32	0 83	5 97E-01	3 60E 02
Trichloroethylene		0 007				
Pyrene						
Arsenic	21 9	13 5	14 5	12 5	1 49E+01	3 25E 01
Barium	217	94 8	215	207	1 93E+02	4 20E+00
Boron	687	420	1230	1380	1 05E+03	2 30E+01
Cadmium	4660	2010	3690	4280	3 77E+03	8 22E+01
Calcium						
Chromium	2640	1180	3190	2900	2 67E+03	5 82E+01
Lead	182	83	191	187	1 70E+02	3 71E+00
Magnesium	24200	10400	23300	24100	2 16E+04	4 71E+02
Mercury	5	5 3	12	14	1 04E+01	2 27E-01
Nickel	738	339	902	822	7 54E+02	1 65E+01
Potassium	62300	28700	67900	67100	6 02E+04	1 31E+03
Selenium	194	89 7	218	187	1 8E+02	3 98E+00
Silver	156	64 6	153	166	1 43E+02	3 12E+00
Sodium	84000	39200	95900	96300	8 46E+04	1 85E+03
Ammonia	84	64	28	71	5 77E+01	1 26E+00
CN	25	21	190	110	1 08E+02	2 35E+00
Cl-	3200	3200	3600	3400	3 40E+03	7 42E+01
NO3-	8200	9000	8800	8400	8 60E+03	1 88E+02
SO4=	4200	4400	5200	5600	5 03E+03	1 10E+02
Total Organic Carbon	3500	6200	4600	6400	5 28E+03	1 15E+02
Total	1 99E+05	1 05E+05	2 19E+05	2 22E+05	1 98E+05	4 32E+03
Moisture - Gravimetric %	69	33 1	72 5	67 9	6 38E+01	3 85E+04
Moisture - Karl Fisher %						
Specific Gravity					1 34E+00	
	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	Curies
Gross Alpha - pCi/g	6600	6300	3400	4700	4 85E+03	1 06E 01
Gross Beta - pCi/g	780	860	540	600	6 53E+02	1 43E 02
Sludge Liters					4 50E+04	
Sludge Dry Weight, KG					2 18E+04	
Sludge Weight KG					6 03E+04	4 28E+04
Sludge Volume gallons					1 19E+04	
# of 10000 gallon tanks					2	

Excel File NUSPSLG XLS

	By [illegible] Date 12/15/93 Chk By [illegible] Date 12 15 93					
		Less then Multiplyer =	1 0			
					Conservative	Conservative
		Weston	NUS	Best Estimate	Estimate	Estimate
Analyte	Molecular	207A-CP-SL	PS207A	207A Sludge	207A Sludge	207A Sludge
	Weight	mg/kg	mg/kg	mg/kg	mg/kg	KG
1,1,1-Trichloroethane			0 024	2 40E-02	2 40E 02	2 77E-05
Trichlorotrifluoroethane	197 5		0 26	2 60E-01	2 60E 01	3 00E 04
Tetrachloroethylene	165 8		0 29	2 90E 01	2 90E 01	3 34E 04
Trichloroethylene	131 4		0 029	2 90E 02	2 90E 02	3 34E-05
Aluminum	26 98	35700		3 57E+04	3 57E+04	4 12E+01
Arsenic	74 92		40 2	4 02E+01	4 02E+01	4 64E-02
Barium	137 33	476	210	3 43E+02	4 76E+02	5 49E 01
Beryllium	9 012	345		3 45E+02	3 45E+02	3 98E 01
Boron	10 81		84 3	8 43E+01	8 43E+01	9 72E 02
Cadmium	112 41	4730	1300	3 02E+03	4 73E+03	5 45E+00
Calcium	40 08	72700		7 27E+04	7 27E+04	8 38E+01
Chromium	51 996	2330	658	1 49E+03	2 33E+03	2 69E+00
Copper	63 546	1660		1 66E+03	1 66E+03	1 91E+00
Iron	55 847	18400		1 84E+04	1 84E+04	2 12E+01
Lead	106 4	265	89	1 77E+02	2 65E+02	3 06E-01
Magnesium	24 305	15000	11400	1 32E+04	1 50E+04	1 73E+01
Manganese	54 938	257		2 57E+02	2 57E+02	2 96E 01
Mercury	200 59	160	0 8	8 04E+01	1 60E+02	1 85E-01
Nickel	58 7	365	102	2 34E+02	3 65E+02	4 21E 01
Potassium	39 098	12100	7340	9 72E+03	1 21E+04	1 40E+01
Silicon	28 06	22200		2 22E+04	2 22E+04	2 56E+01
Silver	107 87	196	45 7	1 21E+02	1 96E+02	2 26E 01
Sodium	22 99	20600	14500	1 76E+04	2 06E+04	2 38E+01
Strontium	87 62	770		7 70E+02	7 70E+02	8 88E-01
Thallium	204 37			0 00E+00	0 00E+00	0 00E+00
Zinc	65 38	677		6 77E+02	6 77E+02	7 81E 01
Chloride	35 453		400	4 00E+02	4 00E+02	4 61E 01
Cyanide	26 0177		1 6	1 60E+00	1 60E+00	1 85E 03
Sulfate	96 06		400	4 00E+02	4 00E+02	4 61E 01
Nitrite	46			0 00E+00	0 00E+00	0 00E+00
Nitrate	62		700	7 00E+02	7 00E+02	8 07E 01
PO4---	94 97			0 00E+00	0 00E+00	0 00E+00
Sulfide	32 06			0 00E+00	0 00E+00	0 00E+00
Phosphorus	30 97			0 00E+00	0 00E+00	0 00E+00
Ammonia	17 0237		36	3 60E+01	3 60E+01	4 15E-02
Nitrogen(TKN)	14			0 00E+00	0 00E+00	0 00E+00
TOC	12		14000	1 40E+04	1 40E+04	1 61E+01
Grand Total		2 09E+05	5 13E+04	2 14E+05	2 25E+05	2 59E+02
% Solids		11 2	12 7	12 0	12 7	
Sludge, Liters		8 26E+03	8 26E+03	8 26E+03	8 26E+03	
Specific grav		1 10E+00	1 1	1 10E+00	1 10E+00	
Sludge, Kg (Wet)		9 08E+03	9 08E+03	9 08E+03	9 08E+03	8 19E+03
Sludge, Kg (Dry)		1 02E+03	1 15E+03	1 09E+03	1 15E+03	
Moisture - Kg		8 06E+03	7 93E+03	8 00E+03	7 93E+03	
# 10,000 gal tank					0 22	
		pCi/g (dry)	pCi/g (dry)	pCi/g (dry)	pCi/g (dry)	Curies
Gross alpha		5 10E+03	570	2 84E+03	5 10E+03	5 88E-03
Gross beta		1 40E+03	95	7 48E+02	1 40E+03	1 61E-03
U-234		3100		3 10E+03	3 10E+03	3 57E-03
U-235		94 6		9 46E+01	9 46E+01	1 09E 04
U-238		3430		3 43E+03	3 43E+03	3 96E 03
Am-241		87 7		8 77E+01	8 77E+01	1 01E-04
Pu 239		213		2 13E+02	2 13E+02	2 46E-04
Total Specific Isotopes						
Sum of Gross						

Excel File SLCOMB2 XLS

	By A.C. Stalker Date 12/15/93 Chk By [illegible] Date 12-15-93						
	Weston Average	NUS	Best Estimate	Conservative Estimate	Conservative Estimate		Weston Average
Analyte	207BN	PS207BN	207BN Sludge	207BN Sludge	207BN Sludge		207BC
	mg/kg	mg/kg	mg/kg	mg/kg	KG		mg/kg
1,1,1-Trichloroethane							
Trichlorotrifluoroethane							
Tetrachloroethylene							
Trichloroethylene							
Aluminum	3 64E+03		3 64E+03	3 64E+03	3 60E+02		2 20E+03
Arsenic			0 00E+00	0 00E+00	0 00E+00		
Barium	1 39E+02	105	1 22E+02	1 39E+02	1 37E+01		
Beryllium			0 00E+00	0 00E+00	0 00E+00		1 00E+01
Boron		14 6	1 46E+01	1 46E+01	1 44E+00		
Cadmium	1 30E+01	8 73	1 09E+01	1 30E+01	1 29E+00		9 58E+01
Calcium	2 42E+05		2 42E+05	2 42E+05	2 39E+04		1 12E+05
Chromium	3 45E+01	23 2	2 89E+01	3 45E+01	3 41E+00		1 36E+02
Copper	1 71E+01		1 71E+01	1 71E+01	1 69E+00		8 85E+01
Iron	4 02E+03		4 02E+03	4 02E+03	3 98E+02		2 53E+03
Lead	1 19E+01	15 8	1 38E+01	1 58E+01	1 56E+00		1 26E+01
Magnesium	4 54E+03	3810	4 18E+03	4 54E+03	4 49E+02		1 28E+04
Manganese	7 50E+01		7 50E+01	7 50E+01	7 41E+00		1 63E+02
Mercury		0 55	5 50E 01	5 50E 01	5 44E 02		2 48E+00
Nickel		8 3	8 30E+00	8 30E+00	8 21E 01		
Potassium		1400	1 40E+03	1 40E+03	1 38E+02		9 66E+03
Silicon	2 16E+03		2 16E+03	2 16E+03	2 14E+02		2 79E+03
Silver			0 00E+00	0 00E+00	0 00E+00		
Sodium			0 00E+00	0 00E+00	0 00E+00		3 19E+04
Strontium	6 80E+02		6 80E+02	6 80E+02	6 72E+01		8 17E+02
Thallium	7 30E+00		7 30E+00	7 30E+00	7 22E 01		
Zinc	9 50E+01		9 50E+01	9 50E+01	9 39E+00		1 84E+02
Chloride	1 63E+03	245	9 39E+02	1 63E+03	1 61E+02		1 26E+04
Cyanide			0 00E+00	0 00E+00	0 00E+00		1 15E+01
Sulfate		3100	3 10E+03	3 10E+03	3 07E+02		8 24E+03
Nitrite	3 51E+01		3 51E+01	3 51E+01	3 47E+00		1 44E+03
Nitrate	2 80E+03	136	1 47E+03	2 80E+03	2 77E+02		5 30E+04
PO4---	4 24E+00		4 24E+00	4 24E+00	4 19E 01		1 66E+01
Sulfide	3 80E+01		3 80E+01	3 80E+01	3 76E+00		
Phosphorus	2 54E+01		2 54E+01	2 54E+01	2 51E+00		2 10E+03
Ammonia	7 40E+01		7 40E+01	7 40E+01	7 31E+00		1 91E+02
Nitrogen(TKN)	1 80E+03		1 80E+03	1 80E+03	1 78E+02		1 83E+04
TOC	1 11E+04	3230	7 15E+03	1 11E+04	1 10E+03		2 15E+04
Grand Total	2 75E+05	1 21E+04	2 73E+05	2 80E+05	2 76E+04		2 93E+05
% Solids	24 8	24 9	24 9	24 9			9 1
Sludge, Liters	3 31E+05	3 31E+05	3 31E+05	3 31E+05			3 45E+05
Specific grav	1 20E+00	1 2	1 20E+00	1 20E+00			1 00E+00
Sludge, Kg (Wet)	3 97E+05	3 97E+05	3 97E+05	3 97E+05	3 26E+05		3 45E+05
Sludge, Kg (Dry)	9 86E+04	9 89E+04	9 87E+04	9 89E+04			3 15E+04
Moisture Kg	2 98E+05	2 98E+05	2 98E+05	2 98E+05			3 14E+05
# 10,000 gal tank				8 7			
	pCi/g (dry)	pCi/g (dry)	pCi/g (dry)	pCi/g (dry)	Curies		pCi/g (dry)
Gross alpha	3 23E+01	8 9	2 06E+01	3 23E+01	3 19E-03		1 21E+02
Gross beta	4 35E+01	7 28	2 54E+01	4 35E+01	4 30E 03		3 53E+02
U-234	1 40E+01		1 40E+01	1 40E+01	1 38E-03		7 39E+01
U-235	3 94E-01		3 94E 01	3 94E-01	3 89E 05		2 44E+00
U-238	9 18E+00		9 18E+00	9 18E+00	9 07E 04		7 95E+01
Am-241			0 00E+00	0 00E+00	0 00E+00		3 15E+00
Pu 239	4 03E+00		4 03E+00	4 03E+00	3 98E 04		4 19E+00
Total Specific Isotopes							
Sum of Gross							

By [signature] Date 12/17/93 Chk By [signature] Date 12-17-93

Analyte	NUS PS207BC mg/kg	Best Estimate 207BC Sludge mg/kg	Conservative Estimate 207BC Sludge mg/kg	Conservative Estimate 207BC Sludge KG		Western Average 207BS mg/kg	NUS PS207BS mg/kg
1,1,1-Trichloroethane							
Trichlorotrifluoroethane							
Tetrachloroethylene							0 24
Trichloroethylene							
Aluminum		2 20E+03	2 20E+03	6 92E+01		1 92E+03	
Arsenic		0 00E+00	0 00E+00	0 00E+00			40 6
Barium	82 3	8 23E+01	8 23E+01	2 59E+00			101
Beryllium		1 00E+01	1 00E+01	3 15E 01			
Boron	129	1 29E+02	1 29E+02	4 06E+00		1 29E+02	218
Cadmium	57 9	7 69E+01	9 58E+01	3 02E+00		2 52E+01	21
Calcium		1 12E+05	1 12E+05	3 54E+03		1 19E+05	
Chromium	64 3	1 00E+02	1 36E+02	4 28E+00		2 97E+01	35 4
Copper		8 85E+01	8 85E+01	2 78E+00		1 13E+02	
Iron		2 53E+03	2 53E+03	7 97E+01		2 74E+03	
Lead		1 26E+01	1 26E+01	3 97E 01		1 28E+01	32 5
Magnesium	12400	1 26E+04	1 28E+04	4 02E+02		1 03E+04	9500
Manganese		1 63E+02	1 63E+02	5 13E+00		1 25E+02	
Mercury	2 15	2 31E+00	2 48E+00	7 79E 02			
Nickel		0 00E+00	0 00E+00	0 00E+00			
Potassium	12000	1 08E+04	1 20E+04	3 78E+02		7 67E+03	8950
Silicon		2 79E+03	2 79E+03	8 79E+01		4 39E+03	
Silver		0 00E+00	0 00E+00	0 00E+00		1 23E+01	12
Sodium	41900	3 69E+04	4 19E+04	1 32E+03		2 61E+04	20400
Strontium		8 17E+02	8 17E+02	2 57E+01		7 00E+02	
Thallium		0 00E+00	0 00E+00	0 00E+00			
Zinc		1 84E+02	1 84E+02	5 79E+00		1 56E+02	
Chloride	4650	8 63E+03	1 26E+04	3 97E+02		1 20E+04	
Cyanide	0 635	6 04E+00	1 15E+01	3 60E-01		3 93E+01	1 06
Sulfate	970	4 60E+03	8 24E+03	2 59E+02		8 45E+03	610
Nitrite		1 44E+03	1 44E+03	4 54E+01		3 45E+03	
Nitrate	1320	2 72E+04	5 30E+04	1 67E+03		5 52E+04	1690
PO4---		1 66E+01	1 66E+01	5 23E 01		2 12E+01	
Sulfide		0 00E+00	0 00E+00	0 00E+00			
Phosphorus		2 10E+03	2 10E+03	6 61E+01		1 54E+03	
Ammonia	42 8	1 17E+02	1 91E+02	6 00E+00		3 98E+02	21 1
Nitrogen(TKN)		1 83E+04	1 83E+04	5 77E+02		1 32E+04	
TOC	7350	1 44E+04	2 15E+04	6 77E+02		2 08E+04	8580
Grand Total	8 10E+04	2 59E+05	3 06E+05	9 63E+03		2 89E+05	5 02E+04
% Solids	8 7	8 9	9 1			13 0	21 6
Sludge, Liters	3 45E+05	3 45E+05	3 45E+05			1 82E+05	1 82E+05
Specific grav	1	1 00E+00	1 00E+00			1 10E+00	1 075
Sludge, Kg (Wet)	3 45E+05	3 45E+05	3 45E+05	3 23E+05		2 00E+05	1 95E+05
Sludge, Kg (Dry)	3 01E+04	3 08E+04	3 15E+04			2 59E+04	4 22E+04
Moisture - Kg	3 15E+05	3 14E+05	3 14E+05			1 74E+05	1 53E+05
# 10,000 gal tank			9 1				
	pCi/g (dry)	pCi/g (dry)	pCi/g (dry)	Curies		pCi/g (dry)	pCi/g (dry)
Gross alpha	16 8	6 90E+01	1 21E+02	3 82E 03		1 74E+02	40 1
Gross beta	14 5	1 84E+02	3 53E+02	1 11E-02		5 46E+02	28 3
U 234		7 39E+01	7 39E+01	2 33E 03		1 03E+02	
U 235		2 44E+00	2 44E+00	7 67E-05		2 91E+00	
U-238		7 95E+01	7 95E+01	2 50E 03		1 19E+02	
Am-241		3 15E+00	3 15E+00	9 92E-05		1 93E+00	
Pu-239		4 19E+00	4 19E+00	1 32E 04		6 33E+00	
Total Specific Isotopes							
Sum of Gross							

	By [illegible] Date 12/15/93 Chk By [illegible] Date 12/15/93					
		Conservative	Conservative	Conservative	Conservative	Conservative
	Best Estimate	Estimate	Estimate	Estimate	Estimate	Estimate
Analyte	207BS Sludge	207BS Sludge	207BS Sludge	B Pond Sludge	B Pond Sludge	A/B Sludge
	mg/kg	mg/kg	KG	KG	mg/kg	KG
1,1,1 Trichloroethane				0 00E+00	0 00E+00	2 77E 05
Trichlorotrifluoroethane				0 00E+00	0 00E+00	3 00E 04
Tetrachloroethylene	2 40E 01	2 40E 01	1 02E 02	1 02E 02	5 92E 02	1 06E-02
Trichloroethylene				0 00E+00	0 00E+00	3 34E 05
Aluminum	1 92E+03	1 92E+03	8 18E+01	5 10E+02	2 95E+03	5 52E+02
Arsenic	4 06E+01	4 06E+01	1 73E+00	1 73E+00	1 00E+01	1 78E+00
Barium	1 01E+02	1 01E+02	4 31E+00	2 06E+01	1 19E+02	2 12E+01
Beryllium	0 00E+00	0 00E+00	0 00E+00	3 15E 01	1 82E+00	7 13E 01
Boron	1 74E+02	2 18E+02	9 31E+00	1 48E+01	8 56E+01	1 49E+01
Cadmium	2 31E+01	2 52E+01	1 08E+00	5 38E+00	3 11E+01	1 08E+01
Calcium	1 19E+05	1 19E+05	5 10E+03	3 26E+04	1 88E+05	3 27E+04
Chromium	3 25E+01	3 54E+01	1 51E+00	9 21E+00	5 32E+01	1 19E+01
Copper	1 13E+02	1 13E+02	4 81E+00	9 28E+00	5 36E+01	1 12E+01
Iron	2 74E+03	2 74E+03	1 17E+02	5 94E+02	3 43E+03	6 15E+02
Lead	2 27E+01	3 25E+01	1 39E+00	3 35E+00	1 93E+01	3 65E+00
Magnesium	9 89E+03	1 03E+04	4 39E+02	1 29E+03	7 46E+03	1 31E+03
Manganese	1 25E+02	1 25E+02	5 34E+00	1 79E+01	1 03E+02	1 82E+01
Mercury	0 00E+00	0 00E+00	0 00E+00	1 32E-01	7 64E 01	3 17E-01
Nickel	0 00E+00	0 00E+00	0 00E+00	8 21E 01	4 74E+00	1 24E+00
Potassium	8 31E+03	8 95E+03	3 82E+02	8 98E+02	5 19E+03	9 12E+02
Silicon	4 39E+03	4 39E+03	1 87E+02	4 89E+02	2 82E+03	5 14E+02
Silver	1 22E+01	1 23E+01	5 26E 01	5 26E 01	3 04E+00	7 52E 01
Sodium	2 32E+04	2 61E+04	1 11E+03	2 43E+03	1 41E+04	2 46E+03
Strontium	7 00E+02	7 00E+02	2 99E+01	1 23E+02	7 10E+02	1 24E+02
Thallium	0 00E+00	0 00E+00	0 00E+00	7 22E 01	4 17E+00	7 22E 01
Zinc	1 56E+02	1 56E+02	6 68E+00	2 19E+01	1 26E+02	2 26E+01
Chloride	1 20E+04	1 20E+04	5 12E+02	1 07E+03	6 18E+03	1 07E+03
Cyanide	2 02E+01	3 93E+01	1 68E+00	2 04E+00	1 18E+01	2 04E+00
Sulfate	4 53E+03	8 45E+03	3 61E+02	9 26E+02	5 35E+03	9 27E+02
Nitrite	3 45E+03	3 45E+03	1 48E+02	1 96E+02	1 14E+03	1 96E+02
Nitrate	2 84E+04	5 52E+04	2 36E+03	4 30E+03	2 49E+04	4 30E+03
PO4---	2 12E+01	2 12E+01	9 04E 01	1 85E+00	1 07E+01	1 85E+00
Sulfide	0 00E+00	0 00E+00	0 00E+00	3 76E+00	2 17E+01	3 76E+00
Phosphorus	1 54E+03	1 54E+03	6 58E+01	1 34E+02	7 77E+02	1 34E+02
Ammonia	2 10E+02	3 98E+02	1 70E+01	3 03E+01	1 75E+02	3 04E+01
Nitrogen(TKN)	1 32E+04	1 32E+04	5 64E+02	1 32E+03	7 62E+03	1 32E+03
TOC	1 47E+04	2 08E+04	8 86E+02	2 66E+03	1 54E+04	2 67E+03
Grand Total	2 49E+05	2 90E+05	1 24E+04	4 97E+04	2 87E+05	4 99E+04
% Solids	17 3	21 6		18 4		18 4
Sludge, Liters	1 82E+05	1 82E+05		8 58E+05		8 66E+05
Specific grav	1 09E+00	1 09E+00		1 10E+00		1 10E+00
Sludge, Kg (Wet)	1 98E+05	1 98E+05	1 67E+05	9 40E+05		9 49E+05
Sludge, Kg (Dry)	3 42E+04	4 27E+04		1 73E+05		1 74E+05
Moisture - Kg	1 64E+05	1 55E+05		7 67E+05		7 75E+05
# 10,000 gal tank		4 8		23		23
	pCi/g (dry)	pCi/g (dry)	Curies	Curies	pCi/g	Curies
Gross alpha	1 07E+02	1 74E+02	7 42E 03	1 44E 02	8 34E+01	2 03E 02
Gross beta	2 87E+02	5 46E+02	2 33E 02	3 87E 02	2 24E+02	4 03E 02
U 234	1 03E+02	1 03E+02	4 41E-03	8 12E 03	4 69E+01	1 17E 02
U 235	2 91E+00	2 91E+00	1 24E 04	2 40E 04	1 39E+00	3 49E 04
U 238	1 19E+02	1 19E+02	5 09E 03	8 50E-03	4 91E+01	1 25E 02
Am-241	1 93E+00	1 93E+00	8 22E 05	1 81E 04	1 05E+00	2 83E 04
Pu 239	6 33E+00	6 33E+00	2 70E 04	8 00E 04	4 62E+00	1 05E 03
Total Specific Isotopes						
Sum of Gross						

Excel File SLCOMB2 XLS

	By [illegible] Date 12/15/93 Chk By [illegible] Date 12-15-93							
			37854	Release Fraction =		1 09E-06		
			Liters	Local Volume (cubic meters) =		1 00E+03		
	Conservative		10,000 Gal	A+B mix	A+B mix	A+B mix		10,000 Gal
	Estimate		Tank	Release	Worker	Safety		Tank
Analyte	A/B Sludge		A+ B mix	Inventory	Exposure	Fraction		A/B Sludge
	mg/kg		KG	mg	mg/m3	TWA/Exp		KG
1,1,1-Trichloroethane	1 59E-04		2 77E-05	3 02E 05	3 02E-08	1 58E 11		1 21E 06
Trichlorotrifluoroethane	1 72E-03		3 00E-04	3 27E 04	3 27E 07	0 00E+00		1 31E 05
Tetrachloroethylene	6 08E-02		6 88E-04	7 50E 04	7 50E 07	2 21E 09		4 63E 04
Trichloroethylene	1 92E-04		3 34E-05	3 65E 05	3 65E 08	1 36E 10		1 46E 06
Aluminum	3 17E+03		5 88E+01	6 41E+01	6 41E 02	3 20E 02		2 41E+01
Arsenic	1 02E+01		1 06E-01	1 16E 01	1 16E-04	5 79E 04		7 78E 02
Barium	1 22E+02		1 26E+00	1 38E+00	1 38E 03	2 75E 03		9 27E 01
Beryllium	4 09E+00		4 09E-01	4 46E 01	4 46E 04	2 23E 01		3 12E 02
Boron	8 56E+01		6 08E 01	6 63E 01	6 63E-04	6 63E-04		6 52E 01
Cadmium	6 22E+01		5 64E+00	6 15E+00	6 15E 03	1 23E 01		4 74E 01
Calcium	1 87E+05		1 21E+03	1 32E+03	1 32E+00	1 32E 01		1 43E+03
Chromium	6 83E+01		3 00E+00	3 28E+00	3 28E 03	6 55E 02		5 20E 01
Copper	6 43E+01		2 23E+00	2 44E+00	2 44E 03	2 44E 03		4 89E 01
Iron	3 53E+03		4 17E+01	4 55E+01	4 55E 02	4 55E 02		2 69E+01
Lead	2 10E+01		4 21E-01	4 59E 01	4 59E 04	3 06E 03		1 60E 01
Magnesium	7 51E+03		6 18E+01	6 74E+01	6 74E 02	6 74E 03		5 72E+01
Manganese	1 04E+02		9 13E-01	9 96E 01	9 96E 04	1 99E 04		7 95E 01
Mercury	1 82E+00		1 89E-01	2 06E 01	2 06E 04	2 06E 02		1 38E 02
Nickel	7 13E+00		4 49E-01	4 90E 01	4 90E 04	4 90E 04		5 43E 02
Potassium	5 24E+03		4 50E+01	4 90E+01	4 90E 02	2 45E 02		3 99E+01
Silicon	2 95E+03		4 25E+01	4 63E+01	4 63E 02	4 63E 03		2 25E+01
Silver	4 32E+00		2 44E-01	2 66E 01	2 66E 04	2 66E 02		3 29E 02
Sodium	1 41E+04		1 08E+02	1 17E+02	1 17E 01	5 87E 02		1 07E+02
Strontium	7 10E+02		5 13E+00	5 59E+00	5 59E 03	5 59E 04		5 41E+00
Thallium	4 14E+00		2 49E-02	2 71E 02	2 71E-05	2 71E 04		3 16E 02
Zinc	1 30E+02		1 54E+00	1 67E+00	1 67E 03	1 67E 04		9 90E 01
Chloride	6 15E+03		3 74E+01	4 08E+01	4 08E 02	0 00E+00		4 68E+01
Cyanide	1 17E+01		7 21E-02	7 86E 02	7 86E 05	1 57E 05		8 91E 02
Sulfate	5 32E+03		3 24E+01	3 53E+01	3 53E 02	0 00E+00		4 05E+01
Nitrite	1 13E+03		6 78E+00	7 39E+00	7 39E 03	0 00E+00		8 59E+00
Nitrate	2 47E+04		1 49E+02	1 63E+02	1 63E 01	0 00E+00		1 88E+02
PO4---	1 06E+01		6 37E-02	6 94E 02	6 94E 05	0 00E+00		8 07E 02
Sulfide	2 16E+01		1 30E-01	1 41E 01	1 41E 04	0 00E+00		1 64E 01
Phosphorus	7 72E+02		4 64E+00	5 06E+00	5 06E 03	0 00E+00		5 88E+00
Ammonia	1 74E+02		1 09E+00	1 19E+00	1 19E-03	6 98E 05		1 33E+00
Nitrogen(TKN)	7 57E+03		4 55E+01	4 96E+01	4 96E 02	0 00E+00		5 77E+01
TOC	1 53E+04		1 08E+02	1 18E+02	1 18E-01	0 00E+00		1 17E+02
Grand Total	2 87E+05		1 97E+03	2 15E+03	2 15E+00	7 74E-01		2 18E+03
% Solids			14 7					18 4
Sludge, Liters			3 79E+04					3 79E+04
Specific grav			1 07E+00					1 10E+00
Sludge, Kg (Wet)			4 06E+04	4 43E+04	4 43E+01			4 15E+04
Sludge, Kg (Dry)			5 97E+03	6 51E+03	6 51E+00	6 51E-01		7 62E+03
Moisture - Kg			3 46E+04	3 78E+04	3 78E+01			3 39E+04
# 10,000 gal tank			1					1
	pCi/g		Curies	Curies	uCi/cc	Rem CEDE		Curies
Gross alpha	1 17E+02		6 38E-03	6 95E 09	6 95E-12	6 22E 04		8 88E 04
Gross beta	2 32E+02		2 95E-03	3 22E 09	3 22E 12	5 52E 06		1 76E 03
U-234	6 72E+01		3 86E-03	4 20E-09	4 20E-12	6 89E-06		5 11E 04
U 235	2 00E+00		1 17E-04	1 28E-10	1 28E-13	1 94E 07		1 53E 05
U 238	7 15E+01		4 25E-03	4 63E-09	4 63E-12	6 75E-06		5 45E 04
Am-241	1 62E+00		1 07E-04	1 17E-10	1 17E 13	1 08E 05		1 23E 05
Pu-239	6 00E+00		2 73E-04	2 98E 10	2 98E-13	2 66E 05		4 57E 05
Total Specific Isotopes						5 12E 05		
Sum of Gross						6 27E 04		

	By [signature] Date 12/15/93 Chk By [signature] Date 12-15-93					
				Release Fr =	1 09E 06	
				3430	Truck	Truck
	A/B Sludge	A/B Sludge	A/B Sludge	Gallon	A + B mix	A + B mix
	Release	Worker	Safety	Truck	Release	Worker
Analyte	Inventory	Exposure	Fraction	A + B mix	Inventory	Exposure
	mg	mg/m3	TWA/Exp	KG	mg	mg/m3
1,1,1-Trichloroethane	1 32E 06	1 32E-09	6 90E-13	2 77E 05	3 02E 05	3 02E 08
Trichlorotrifluoroethane	1 43E-05	1 43E-08	0 00E+00	3 00E 04	3 27E 04	3 27E 07
Tetrachloroethylene	5 04E-04	5 04E-07	1 49E 09	4 56E-04	4 97E-04	4 97E 07
Trichloroethylene	1 59E-06	1 59E-09	5 92E-12	3 34E-05	3 65E 05	3 65E 08
Aluminum	2 63E+01	2 63E 02	1 31E 02	4 72E+01	5 15E+01	5 15E 02
Arsenic	8 48E-02	8 48E-05	4 24E 04	6 69E-02	7 29E-02	7 29E 05
Barium	1 01E+00	1 01E-03	2 02E 03	7 94E-01	8 65E 01	8 65E 04
Beryllium	3 40E-02	3 40E-05	1 70E 02	4 02E 01	4 38E 01	4 38E 04
Boron	7 11E-01	7 11E-04	7 11E 04	2 73E 01	2 97E 01	2 97E 04
Cadmium	5 16E-01	5 16E 04	1 03E 02	5 52E+00	6 02E+00	6 02E 03
Calcium	1 56E+03	1 56E+00	1 56E 01	4 70E+02	5 12E+02	5 12E 01
Chromium	5 67E-01	5 67E 04	1 13E 02	2 80E+00	3 05E+00	3 05E 03
Copper	5 34E-01	5 34E 04	5 34E 04	2 02E+00	2 21E+00	2 21E 03
Iron	2 93E+01	2 93E 02	2 93E 02	2 83E+01	3 08E+01	3 08E 02
Lead	1 74E-01	1 74E-04	1 16E 03	3 45E 01	3 76E 01	3 76E 04
Magnesium	6 23E+01	6 23E 02	6 23E 03	3 26E+01	3 55E+01	3 55E-02
Manganese	8 66E-01	8 66E 04	1 73E 04	5 08E 01	5 54E 01	5 54E 04
Mercury	1 51E-02	1 51E-05	1 51E 03	1 86E 01	2 03E 01	2 03E 04
Nickel	5 92E-02	5 92E 05	5 92E 05	4 31E 01	4 69E 01	4 69E 04
Potassium	4 35E+01	4 35E-02	2 17E 02	2 46E+01	2 68E+01	2 68E-02
Silicon	2 45E+01	2 45E-02	2 45E 03	3 14E+01	3 42E+01	3 42E-02
Silver	3 58E-02	3 58E 05	3 58E 03	2 32E 01	2 53E 01	2 53E 04
Sodium	1 17E+02	1 17E 01	5 85E 02	5 26E+01	5 73E+01	5 73E-02
Strontium	5 89E+00	5 89E-03	5 89E 04	2 34E+00	2 55E+00	2 55E 03
Thallium	3 44E-02	3 44E 05	3 44E-04	8 55E 03	9 32E 03	9 32E 06
Zinc	1 08E+00	1 08E 03	1 08E 04	1 04E+00	1 13E+00	1 13E 03
Chloride	5 10E+01	5 10E 02	0 00E+00	1 31E+01	1 43E+01	1 43E 02
Cyanide	9 71E-02	9 71E 05	1 94E 05	2 60E 02	2 83E 02	2 83E 05
Sulfate	4 42E+01	4 42E 02	0 00E+00	1 14E+01	1 25E+01	1 25E 02
Nitrite	9 36E+00	9 36E-03	0 00E+00	2 33E+00	2 54E+00	2 54E 03
Nitrate	2 05E+02	2 05E-01	0 00E+00	5 18E+01	5 65E+01	5 65E 02
PO4---	8 80E-02	8 80E-05	0 00E+00	2 19E-02	2 38E 02	2 38E 05
Sulfide	1 79E-01	1 79E 04	0 00E+00	4 45E 02	4 85E 02	4 85E 05
Phosphorus	6 41E+00	6 41E-03	0 00E+00	1 59E+00	1 74E+00	1 74E 03
Ammonia	1 45E+00	1 45E-03	8 51E 05	4 01E 01	4 37E-01	4 37E 04
Nitrogen(TKN)	6 29E+01	6 29E-02	0 00E+00	1 56E+01	1 70E+01	1 70E 02
TOC	1 27E+02	1 27E-01	0 00E+00	4 76E+01	5 19E+01	5 19E 02
Grand Total	2 38E+03	2 38E+00	3 37E 01	8 48E+02	9 24E+02	9 24E 01
% Solids						
Sludge, Liters				1 30E+04		
Specific grav				8 56E-01		
Sludge, Kg (Wet)	4 52E+04	4 52E+01		1 11E+04	1 21E+04	1 21E+01
Sludge, Kg (Dry)	8 30E+03	8 30E+00		5 41E+02	5 90E+02	5 90E 01
Moisture - Kg	3 69E+04	3 69E+01		1 06E+04	1 15E+04	1 15E+01
# 10,000 gal tank						
	Curies	uCi/cc	Rem CEDE	Curies	Curies	uCi/cc
Gross alpha	9 68E-10	9 68E-13	8 65E-05	6 05E-03	6 60E 09	6 60E 12
Gross beta	1 92E-09	1 92E-12	3 30E-06	2 07E 03	2 26E-09	2 26E-12
U 234	5 57E-10	5 57E-13	9 14E 07	3 67E 03	4 00E-09	4 00E-12
U-235	1 66E-11	1 66E 14	2 52E-08	1 12E 04	1 22E-10	1 22E-13
U-238	5 94E-10	5 94E-13	8 65E-07	4 06E-03	4 42E 09	4 42E 12
Am-241	1 35E-11	1 35E-14	1 24E-06	1 03E-04	1 13E-10	1 13E 13
Pu-239	4 98E-11	4 98E-14	4 45E 06	2 55E-04	2 78E 10	2 78E 13
Total Specific Isotopes			7 50E 06			
Sum of Gross			8 98E 05			

	By [signature] Date 12/15/93 Chk By [signature] Date 12-15-93					
		X/Q (s/m3)		X/Q (s/m3)		
	Truck	5 15E-02	Truck	2 36E 04	Truck	
	A + B mix	Onsite	A + B mix	Maximum	A + B mix	
	Safety	Co-located	Safety	Offsite	Safety	
Analyte	Fraction	Worker	Fraction	Individual	Fraction	
	Exp/TWA	mg/m3	Exp/TWA	mg/m3	Exp/(0 1*TWA)	
1,1,1-Trichloroethane	1 58E-11	1 73E-09	9 04E 13	7 91E 12	4 14E 14	
Trichlorotrifluoroethane	0 00E+00	1 87E-08	0 00E+00	8 57E-11	0 00E+00	
Tetrachloroethylene	1 47E-09	2 84E-08	8 39E-11	1 30E 10	3 84E 12	
Trichloroethylene	1 36E-10	2 09E-09	7 75E-12	9 56E-12	3 55E 13	
Aluminum	2 57E-02	2 95E 03	1 47E 03	1 35E 05	6 75E 05	
Arsenic	3 65E-04	4 17E-06	2 09E 05	1 91E 08	9 56E 07	
Barium	1 73E-03	4 95E-05	9 90E 05	2 27E 07	4 54E 06	
Beryllium	2 19E-01	2 50E-05	1 25E 02	1 15E-07	5 74E-04	
Boron	2 97E-04	1 70E-05	1 70E 05	7 80E 08	7 80E 07	
Cadmium	1 20E-01	3 44E-04	6 88E 03	1 58E 06	3 15E 04	
Calcium	5 12E-02	2 93E-02	2 93E-03	1 34E 04	1 34E 04	
Chromium	6 10E-02	1 74E-04	3 49E 03	7 99E 07	1 60E-04	
Copper	2 21E-03	1 26E-04	1 26E-04	5 79E 07	5 79E 06	
Iron	3 08E-02	1 76E-03	1 76E-03	8 08E-06	8 08E 05	
Lead	2 51E-03	2 15E-05	1 44E 04	9 87E-08	6 58E-06	
Magnesium	3 55E-03	2 03E-03	2 03E 04	9 32E 06	9 32E-06	
Manganese	1 11E-04	3 17E 05	6 34E 06	1 45E 07	2 91E 07	
Mercury	2 03E-02	1 16E 05	1 16E 03	5 32E 08	5 32E 05	
Nickel	4 69E 04	2 69E-05	2 69E 05	1 23E 07	1 23E 06	
Potassium	1 34E-02	1 53E-03	7 67E 04	7 03E-06	3 52E 05	
Silicon	3 42E-03	1 96E-03	1 96E-04	8 97E-06	8 97E-06	
Silver	2 53E 02	1 45E-05	1 45E 03	6 64E 08	6 64E-05	
Sodium	2 87E-02	3 28E-03	1 64E 03	1 50E 05	7 52E-05	
Strontium	2 55E-04	1 46E-04	1 46E 05	6 70E 07	6 70E 07	
Thallium	9 32E-05	5 34E 07	5 34E 06	2 44E 09	2 44E 07	
Zinc	1 13E 04	6 49E-05	6 49E 06	2 97E 07	2 97E 07	
Chloride	0 00E+00	8 20E-04	0 00E+00	3 76E 06	0 00E+00	
Cyanide	5 66E-06	1 62E-06	3 24E-07	7 43E 09	1 49E 08	
Sulfate	0 00E+00	7 14E-04	0 00E+00	3 27E-06	0 00E+00	
Nitrite	0 00E+00	1 45E 04	0 00E+00	6 65E 07	0 00E+00	
Nitrate	0 00E+00	3 23E 03	0 00E+00	1 48E 05	0 00E+00	
PO4---	0 00E+00	1 36E-06	0 00E+00	6 25E 09	0 00E+00	
Sulfide	0 00E+00	2 78E-06	0 00E+00	1 27E 08	0 00E+00	
Phosphorus	0 00E+00	9 94E-05	0 00E+00	4 55E 07	0 00E+00	
Ammonia	2 57E-05	2 50E 05	1 47E 06	1 15E 07	6 74E 08	
Nitrogen(TKN)	0 00E+00	9 75E-04	0 00E+00	4 47E 06	0 00E+00	
TOC	0 00E+00	2 97E-03	0 00E+00	1 36E-05	0 00E+00	
Grand Total	6 11E-01	5 29E-02	3 49E 02	2 42E 04	1 60E 03	
% Solids						
Sludge, Liters						
Specific grav						
Sludge, Kg (Wet)						
Sludge, Kg (Dry)						
Moisture - Kg						
# 10,000 gal tank						
	Rem CEDE	uCi/cc	Rem CEDE	uCi/cc	Rem CEDE	
Gross alpha	5 90E-04	3 78E-13	3 37E-05	1 73E 15	1 55E-07	
Gross beta	3 88E-06	1 29E-13	2 22E-07	5 93E-16	1 02E-09	
U 234	6 56E-06	2 29E-13	3 76E 07	1 05E 15	1 72E-09	
U 235	1 85E-07	6 98E-15	1 06E 08	3 20E 17	4 86E-11	
U 238	6 44E-06	2 53E-13	3 69E 07	1 16E 15	1 69E 09	
Am-241	1 04E-05	6 44E-15	5 93E-07	2 95E-17	2 72E 09	
Pu-239	2 49E-05	1 59E-14	1 42E-06	7 29E-17	6 52E-09	
Total Specific Isotopes	4 84E-05		2 77E-06		1 27E-08	
Sum of Gross	5 94E-04		3 40E 05		1 56E 07	

	By [illegible] Date 12/15/92	Chk By [illegible]	Date 2-15-93	
Analyte	TLV-TWA			
	mg/m3			
1,1,1-Trichloroethane	1910			
Trichlorotrifluoroethane				
Tetrachloroethylene	339			
Trichloroethylene	269			
Aluminum	2	as Al soulble salts		
Arsenic	0 2	as As		
Barium	0 5	as Ba		
Beryllium	0 002	as Be		
Boron	1	as borate		
Cadmium	0 05	as Cd		
Calcium	10	as carbonate or silicate		
Chromium	0 05	as Cr (VI)		
Copper	1	as Cu dust & mist		
Iron	1	as Fe soluble salts		
Lead	0 15	as Pb inorg dust & fumes		
Magnesium	10	MgO fume		
Manganese	5	as Mn dust & compounds		
Mercury	0 01	as Hg skin & alkyl compounds		
Nickel	1	as Ni insoluble compounds		
Potassium	2	as KOH		
Silicon	10	precipitated silica		
Silver	0 01	as Ag		
Sodium	2	as NaOH		
Strontium	10	not listed		
Thallium	0 1	as Tl		
Zinc	10	ZnO dust		
Chloride				
Cyanide	5	as CN		
Sulfate				
Nitrite				
Nitrate				
PO4---				
Sulfide				
Phosphorus				
Ammonia	17	as NH3		
Nitrogen(TKN)				
TOC				
Grand Total				
% Solids				
Sludge, Liters				
Specific grav				
Sludge, Kg (Wet)				
Sludge, Kg (Dry)	10	PNOC		
Moisture - Kg				
# 10,000 gal tank	Class W			
	CEDE	Inhalation		
	Rem/Ci			
Gross alpha	4 30E+08	Assumes all Pu-239		
Gross beta	8 25E+06	Assumes all Pu-241		
U-234	7 89E+06	Class W		
U 235	7 30E+06	Class W		
U 238	7 01E+06	Class w		
Am-241	4 43E+08	Class W		
Pu-239	4 30E+08	Class W		
Total Specific Isotopes				
Sum of Gross				

GENERAL COMPUTATION SHEET

☐ Calc No 93-SAE-004

Subject Hazard Calculations for Early Remediation of Solar Ponds

By J.C. Stalker Date 12/8/93 Chk By Boyd Date 12/13/93 Ong ☒ Rev ☐

2.b. continued

The sludge from Pond A, B North, and B Center has all been pumped into B South. A Pond has had a higher concentration of hazardous material than any of the B ponds, but has a much smaller total volume of sludge. The limiting case for any accident will be the entire contents of A Pond plus any B (mixed) Pond sludge to make up the total volume. The spreadsheet has the mixed B Pond sludge concentration of each analyte calculated from the following equation:

$$\text{Conc } B_{mixed} = \frac{\text{Conc BN} * \text{Vol BN} + \text{Conc BC} * \text{Vol BC} + \text{Conc BS} * \text{Vol BS}}{\text{Vol BN} + \text{Vol BC} + \text{Vol BS}}$$

Results are shown on ~~Page~~ Sheet 18 of the calc.

C. Define Accidents

The sludge is to be sucked into a "GUZZLER" truck at the solar pond, driven into the tent containing 20 or 22 10000 gallon double walled polyethylene tanks. The truck volume is 3232 gallons of sludge. Two accidents are to be analyzed. Complete spillage of the truck and complete spillage of one 10000 gallon tank inside of the tent.

GENERAL COMPUTATION SHEET

Subject Hazard Calculations for Early Remediation of Solar Ponds

By CEStalker Date 12/8/93 Chk By [illegible] Date 12-15-93 Ong ☒ Rev ☐

d. Tent Configuration on the 750 Pad

Three tents will utilized to contain the 10000 gallon tanks.

T3 will contain 20 tanks with a free air space of 3133 cubic meter (see page 165 of personal LOG)

T4 will contain 22 tanks with 3360 m^3 free air

T6 will contain 29 tanks with 7555 m^3 free air

For Solar Ponds A/B remediation all of the Tanks in T3 will be used and the balance will be put into T4. a minimum of 23 tanks will be required

T3 and T4 will each have one empty tank available to be filled in the event of a leaking or spilled tank. T6 will have two.

3. Hazard Calculation

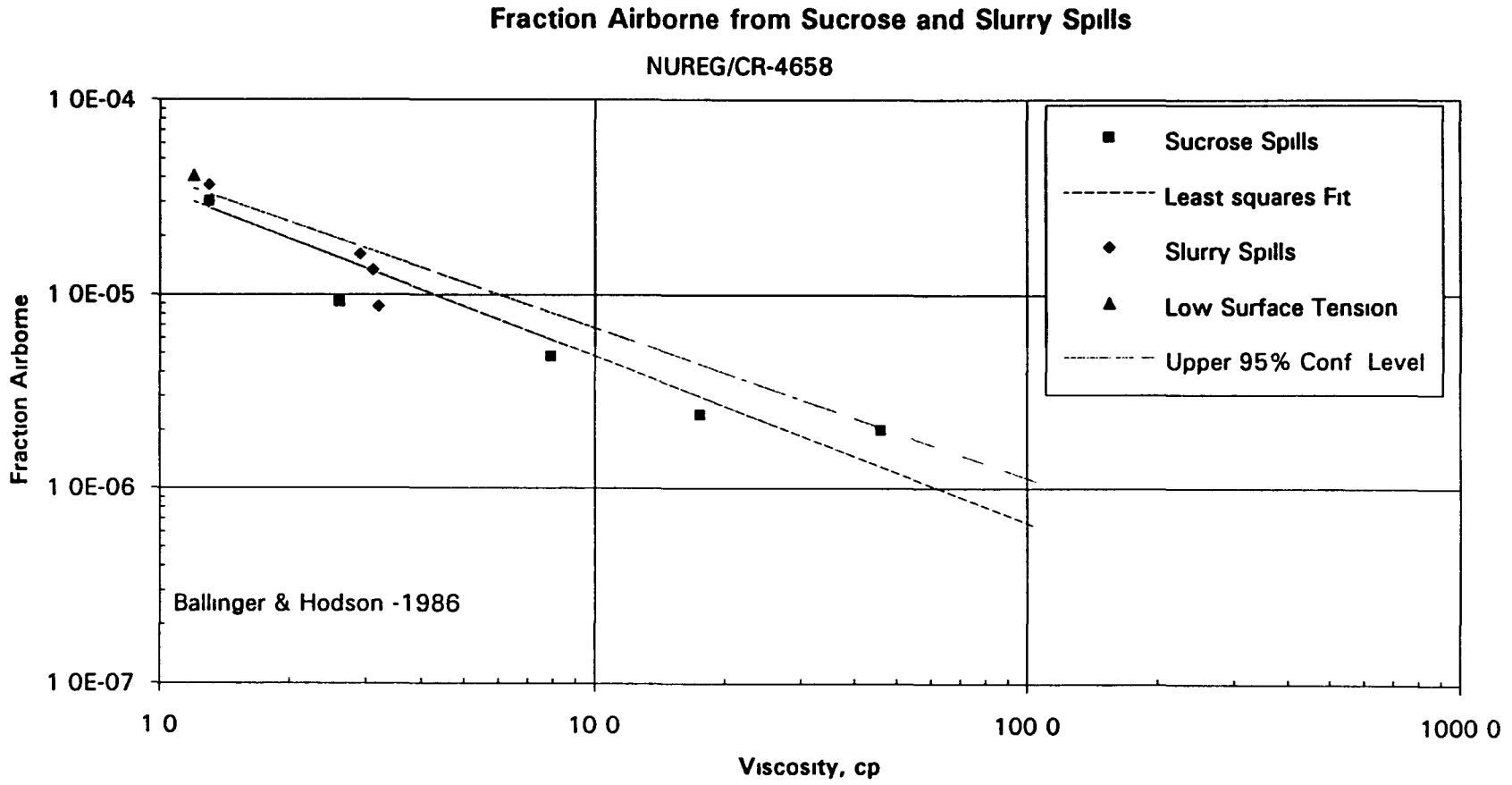
Materiatal-Risk (MAR) * Release fraction (RF) / Air volume = an concentration Local worker

For co-located worker and off site person

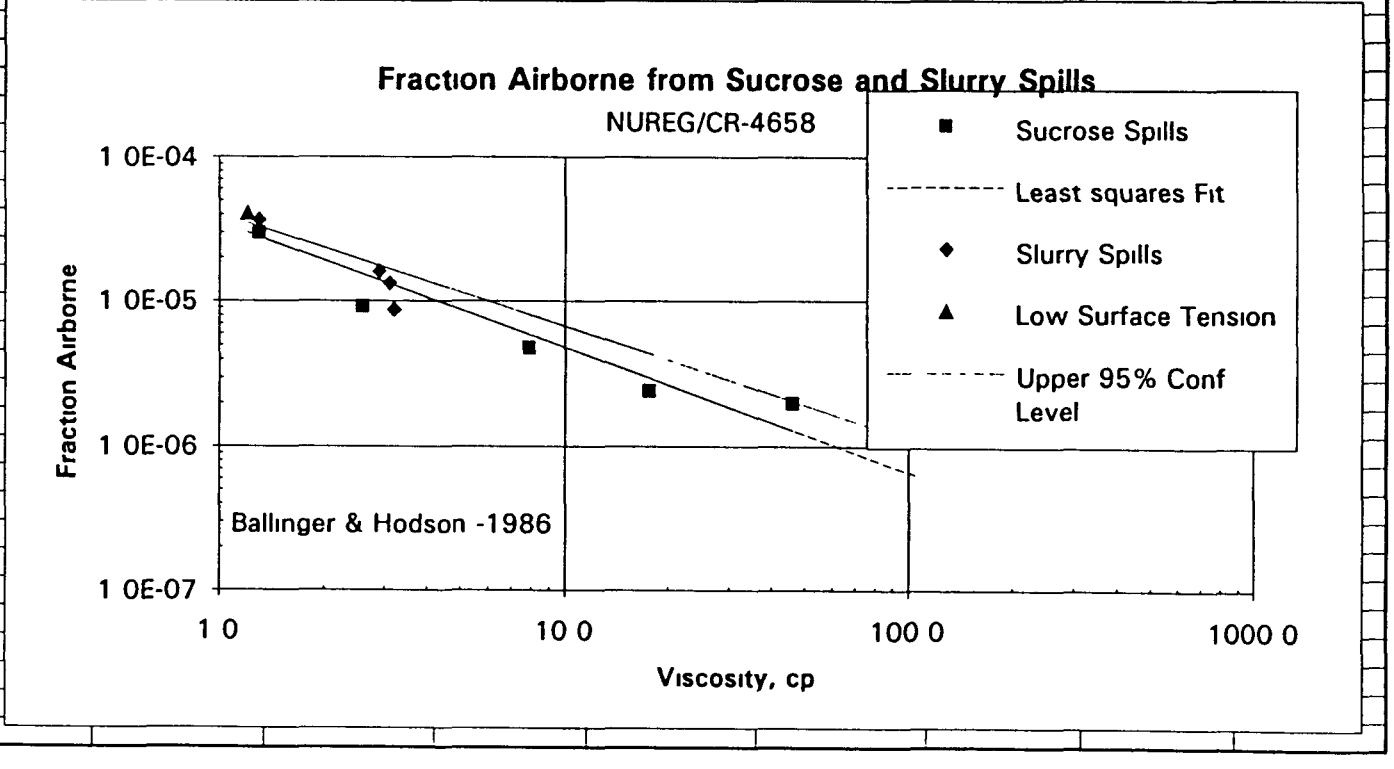
$$\frac{MAR * RF * 7/Q\ (?/m^3)}{\text{duration of release (s)}} = \text{an concentration}$$

d. Release Fraction

NUREG/CR-4658, "Aerosols Generated By Spills of Viscous Solutions and Slurries" was used A least squared fit of Viscosity data vs release fraction was calculated Sheets 25 & 26 provide the details of the calculation.


Fraction Airborne from Sucrose and Slurry Spills
NUREG/CR-4658
1 0E-04
1 0E-05
1 0E-06
1 0E-07
Fraction Airborne
1 0
10 0
100 0
1000 0
Viscosity, cp
Sucrose Spills
Least squares Fit
Slurry Spills
Low Surface Tension
Upper 95% Conf Level
Ballinger & Hodson -1986

Viscosity cp	Fraction Airborne	LOG Viscosity cp	LOG Fraction Airborne	Calculated Fraction Airborne	+2 sigma Calculated Fraction Airborne	Regression Analysis m	Regression Analysis b	Sucrose	Slurry	Low Surface Tension
1 3	3 0E-05	0 262364264	-10 41098539	2 79E 05	3 29E-05	-0 860537342	-10 26122295	3 0E-05		
2 6	9 2E-06	0 955511445	-11 59630707	1 54E-05	1 92E-05	0 084005488	0 143374146	9 2E-06		
7 9	4 8E-06	2 066862759	-12 24689464	5 90E-06	8 11E-06	0 921008221	0 315630167	4 8E-06		
17 5	2 4E-06	2 862200881	-12 94004182	2 98E-06	4 37E-06	104 935907	9	2 4E-06		
46 0	2 0E-06	3 828641396	-13 12236338	1 30E-06	2 06E-06	10 45396712	0 896601619	2 0E-06		
1 3	3 7E-05	0 262364264	-10 21546232	2 79E-05	3 29E-05				3 7E-05	
1 3	3 0E-05	0 262364264	-10 40766863	2 79E-05	3 29E-05				3 0E-05	
2 9	1 6E-05	1 064710737	-11 04292184	1 40E 05	1 77E-05				1 6E-05	
3 1	1 3E-05	1 131402111	-11 22025585	1 32E 05	1 68E-05				1 3E-05	
3 2	8 7E-06	1 16315081	-11 65218753	1 29E-05	1 64E-05				8 7E-06	
1 2	4 1E-05	0 182321557	-10 10193849	2 99E-05	3 50E-05					4 1E-05
105 0		4 65396035		6 37E 07	1 09E-06					



GENERAL COMPUTATION SHEET Sheet 27 of 28 Sheets

☐ Calc No 93-54E-004

Subject Hazard Calculations for Early Remediation of Solar Ponds

By [illegible] Date 12/8/93 Chk By [illegible] Date 12-15-93 Orig ☒ Rev ☐

3.2. continued

a fit of the data extrapolated to 105 centypoise at the +95% confidence level gives a value of 1.09×10^{-6} for the release fractions.

b. atmospheric dispersion

1000 m^3 is used for the local volume dispersion for calculation of the local worker dose. This is ~ 1/3 of the free air volume of tent T3 or T4. This represent a reasonable volume for the evaluation.

For the onsite and offsite evaluation Fstability with 1 m/s wind speed meteorology is assumed. This is a conservative assumption. Sheets 19, 20 & 21 contain the calculated exposure concentrations.

c. Toxic Chemical exposure

The toxic chemical endpoint that is being used in this evaluation is the Threshold Limit Values - Time Weighted Average (TLV-TWA) as published by the American Conference of Governmental Industrial Hygienists (ACGIH). For the local worker and on-site co-located worker the TLV-TWA is used directly and for the public the endpoint is 0.1 * TLV-TWA.

GENERAL COMPUTATION SHEET Sheet 28 of 28 Sheets

☐ Calc No 93-SAE-004

Subject Hazard Calculation for Early Remediation of Solar Ponds

By [illegible] Date 12/8/93 Chk By [illegible] Date 12-15-93 Ong ☒ Rev ☐

3.c. continued

the calculation is $\sum_i \frac{\text{Conc chemical form } i}{\text{TLV-TWA } i}$ = Safety Fraction

The fraction is then compared to 1.0. The results are shown on sheets 19, 20, & 21. TLV-TWA are listed on sheet 22.

d Radiological Exposure

All releases are assumed to occur of a 15 minute (900 second) period The local worker and the public are assumed to be exposed for this 15 minute period The results of the exposure is given in Rem committed effective dose equivalent (CEDE) to the whole body dose conversion factors are taken from ICRP-30 Gross alpha is assumed to be all ^{239}Pu and gross beta is assumed to be all ^{241}Pu Results of the calculation are shown on sheets 19, 20 & 21

4. Conclusions

The A/B Pond sludge can be safely transported to and stored on the 750 Pad

** QA RECORD WHEN COMPLETED **

NUCLEAR SAFETY ENGINEERING CALCULATION
GENERAL CHECKING CRITERIA

Calculation No 93-SAE-004 Checked By [signature] Date 12-15-93

Title Hazard Calculation for Early Remediation of Solar Ponds

Hand Calculation Checklist		Yes	No	N/A	Comments
1	Are analytical methods appropriate?	✓			
2	Are assumptions correct?	✓			
3	Is calculation complete?	✓			
4	Is calculation mathematically accurate?	✓			
5	Do calculational parameters comply with design criteria/dimensions?	✓			
6	Were input data appropriate?	✓			
7	Does the calculation reference or list applicable assumptions and major equation sources?	✓			

Computer Code Checklist					
1	Was an applicable and valid computer program used?*			✓	
2	Are assumptions in input correct?			✓	
3	Was the input entered correctly?			✓	
4	Do the output results seem reasonable?			✓	

Additional Comments

Cut & Paste errors were found in the spread sheets. The typos were corrected and the spreadsheets reprinted

* When stored on floppy disk, confirm that the controlled working copy of the applicable diskette was checked out